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ENHANCING THE OPERATIONAL ART: THE INFLUENCE OF THE INFORMATION ENVIRONMENT ON THE COMMAND-AND-CONTROL OF AIRPOWER

BY

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ABSTRACT

Increases in the range and lethality of combat firepower forced units to disperse for survival and resulted in a corresponding increase in the size of the battlefield. The emergence of the operational level of war, which produced a three-fold rather than a two-fold paradigm of military art, was a consequence of attempts to exercise authority over combat forces in the ever-growing battlespace. Practitioners of the military art have often relied upon information technology (IT), to exercise command-and-control—"the expression of the commander's will and intent."

This thesis investigates the unique aspects of airpower command-and-control to determine how the information atmosphere—the habits of people and the capabilities of technology—has affected the relationships among the levels of war. The scope of this study places primary emphasis on the IT aspects of the information atmosphere in the command-and-control of airpower. In particular, the relationships among the levels of war are examined by assessing the strategic-operational level interface and the operational-tactical interface.

Drawing on evidence from the application of airpower in Vietnam, Operation DESERT STORM, and Operation DELIBERATE FORCE this study concludes that the command-and-control process is determined more by the personalities of the leaders involved than by the available technology. Information technology has had little effect on the strategic-operational interface. The relationships between commanders at the strategic and operational levels are more a function of the command environment established by the strategic leaders than a function of the available technology. Although information technology appears to affect the operational-tactical interface to a greater

degree, by enabling more effective command-and-control, the command relationships between these two levels are largely determined by the human element. The relationships at the respective interfaces suggest that information technology is not reducing or eliminating the requirement for operational-level command echelons. On the contrary, the operational level of war has taken on greater significance than it had prior to recent advances in information technology.

Chapter 1

Introduction

> *When large bodies of armed men are assembled and expected to act in concert, the part played by communication cannot be overemphasized.*
>
> --Martin van Creveld

The value of effective command in war is undeniable and it often determines the difference between victory and defeat. The premium value of command also makes it a highly discussed military topic. Noted historian Martin van Creveld provides perhaps one of the most comprehensive discussions of the functions of command in his book *Command in War*, which traces the evolution of command during the past 2,500 years. He argues that command—a function that has to be exercised, more or less continuously, in order for a military force to exist and operate effectively—is a vital requisite for victory.[1] Fundamental to the function of command is the timely collection of accurate information upon which to base a military decision.[2] Decision-making, therefore, becomes the essence of command. However it is not the complete command dynamic. In order to exercise command, the decision-maker must be able to disseminate orders and monitor compliance, often to locations far away from the command center. The ability to extend authority over distance is known as control.[3] This definition highlights the inextricable link between command-and-control (C2). In fact, the tenets of control are included as subtasks of command: the issuing of clear orders to subordinate commanders and the monitoring of their execution. An important point to add is that the commander should exercise control of operations without unduly interfering with the authority and initiative of subordinates.[4]

Since the dawn of warfare, commanders have recognized that information provides the foundation for both command-and-control.[5] Consequently, they have been striving to

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[1] Martin van Creveld, *Command in War* (Cambridge, Mass.: Harvard University Press, 1985), 5.
[2] Ibid., 7.
[3] Roger Beaumont, *The Nerves of War* (Washington, D.C.: AFCEA International Press, 1986), 8.
[4] Van Creveld, *Command in War*, 7-8.
[5] Alan D. Campen, "Information, Truth and War," in *The First Information War,* ed. Alan D. Campen Fairfax, Va.: AFCEA, 1992), 89.

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improve the accuracy, reliability, and timeliness of the information they receive. Typically these improvements are sought through technological innovation.[6] This certainly seems to be the evolutionary case for the United States Armed Forces, and particularly the United States Air Force (USAF). References to the 1991 Persian Gulf War often proclaim it to have been the first space war and herald the contribution of high-technology American information systems. Since the Gulf War the information technology (IT) systems of the USAF have improved dramatically. The underlying objective is to improve the flow of information necessary for a command decision, subsequently to disseminate control measures, and finally to accomplish the process more rapidly. Both the commander and the communication system are essential to command-and-control. Collectively, the interaction of man and technology create the "information environment."

Reducing decision time may exert profound influence on the prevailing model of war. Improvements in information technology dictate the speed of the command process and have the potential to alter the existing construct of warfare at three levels—strategic, operational, and tactical. In the American experience, this three-level paradigm is a recent development. It was not until the bitter lessons of Vietnam became apparent that planners were able to discard strategic nuclear response assumptions and focus on a middle level of war—operational—that links strategy to tactics.[7] Formal recognition of the operational level of war took place in 1982, when United States Army (USA) Field Manual (FM) 100-5 first articulated the concept of operational art. Elaboration upon the US Army's AirLand Battle Doctrine, put forth in the subsequent 1986 version of FM 100-5, signaled the growing emphasis of operational art. Closer Air Force and Army integration, as a consequence of AirLand Battle, likewise signaled implicit USAF institutional recognition of operational art and the operational level of war.[8]

There is significant disagreement among military analysts concerning the effect that emerging technologies will have on the three-level paradigm of war. Some experts think

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[6] Van Creveld, *Technology and War* (New York: Free Press, 1989), 1. Dr van Creveld advances this thesis, in general, as he analyzes the influence of technology on war from 2000 B.C. to the present.
[7] Michael A. Hennessey and B.J.C. McKercher, "Introduction," *in The Operational Art: Developments in the Theories of War*, ed. B.J.C McKercher and Michael A. Hennessey (Westport, Conn.: Praeger, 1996), 1.
[8] C. Kenneth Allard, *Command, Control, and the Common Defense* (New Haven, Conn.: Yale University Press, 1990), 179.

greater access and flow of information will cause the levels to merge to the point that strategic ends lead directly to tactical means.[9] Others argue that the current construct will remain valid, regardless of the technological means of command-and-control.[10]

The purpose of this thesis is not to engage in this debate directly, but rather, to attempt to qualify the argument by examining the command-and-control of airpower. Specifically, this study will endeavor to determine how the information environment has affected the relationships among the strategic, operational, and tactical levels of air warfare by concentrating on the application of information technology. The information environment not only affects the relationships among the levels of war, but within the levels as well. Therefore, answers to such an open-ended research question can easily become somewhat vague. In order to determine the precise influence of information technology among the levels of war it will be necessary to concentrate on the interaction among the levels. By examining how the information environment, through the employment of information technology, has affected the strategic-operational interface, and the operational-tactical interface, this study will seek to determine the relevance of the operational level of war. Simply put, has current information technology eliminated or significantly reduced the necessity for the operational level of war?

Airpower command-and-control, and information technology are very large areas of study. Naturally, a task of this magnitude must have limits and restrictions. Therefore, the scope of this work will be confined to an assessment of the application of USAF conventional airpower from Vietnam to the present.

Nuclear weapons, being inherently strategic, invalidate the notion of three levels of war. Although nuclear combat negates the conventional paradigm, it provides a legacy with profound influence on conventional conflict. The promulgation of worldwide, real-time, command-and-control systems are the legacy of positive nuclear control.[11] Without the precursory nuclear command-and-control systems, it is doubtful the complex architecture of modern information technology would be available.

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[9] Douglas A. MacGregor, "Future Battle: The Merging Levels of War," *Parameters* 12, no. 4, (Winter 1992-93): 33-47. This article offers one of the most succinct and lucid arguments for this point of view.
[10] Michael L. Warsocki, "Intelligence within Operational Art," *Military Review* 75, no. 2 (March-April 1995): 44-49. Warsocki implies that FM 100-5 continues to hold Operational Art, and hence the Operational level of war, sacrosanct. However, he states that FM 100-5 does not support the argument that the levels of war are merging.

World War II offers the first example of conflict where the worldwide command-and-control system was equal to the battlefield tasks.[12] Following World War II, technological advances and the need to develop a system capable of providing positive nuclear control were the engines of invention. Eventually a worldwide, near real-time communication capability became a reality. The 1970s thus usher in the dawn of the modern era in command-and-control. Therefore, Vietnam provides a useful starting point from which to study the influence of information technology on the command-and-control of airpower. Vietnam provides the first of three case studies. Subsequent evaluation of the Persian Gulf War and the Balkans Air Campaign will provide further evidence.

At the risk of appearing parochial or ethnocentric, this study will also limit discussion to American, and primarily Air Force airpower. This limitation is not intended as a slight to coalition or sister-service aviators, but merely a practical consideration. State-of-the-art information technology puts the USAF on the cutting edge of capability. Additionally, the availability of research material facilitates examination of the American perspective in general and the Air Force point of view in detail. Nevertheless, a desired outcome of this effort is to extract relevant propositions on the influence of information technology on the command-and-control of airpower that benefit all practitioners of the military art.

Although information technology influences warfare at each level, attention will attend primarily to command-and-control of airpower at the operational level of war. The operational level is pertinent for two reasons. First, the operational level offers an ideal location from which to view interactions among all three levels. Metaphorically speaking, it is tantamount to having seats on the 50-yard line. Second, the operational level should be of greatest concern since operational schemes seek to attain strategic goals by employing suitable tactics.[13] For strategists the operational level is important

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[11] Allard, *C2 and the Common Defense*, 136.
[12] Ibid., 99
[13] Edward N. Luttwak, "The Operational Level of War," *International Security* 5, no. 3 (Winter 1980/1981): 61.

because it represents the highest level of war with primary concern still on military activity.[14]

To further refine the scope of this thesis it, is important to describe what it is not. This is not a technical paper providing detailed IT system descriptions. There is already abundant literature on the subject of such information systems. It also will not enter the debates over the relative merits of centralized and decentralized command.[15] Although possible answers to the research question deal with this issue, it is not the direct focus of the study.

A final restriction in scope deals with the definition of information technology. Information technology will be narrowly defined to encompass only command-and-control communication systems. If, indeed, information is the essence, then communication is simply the technical means for effecting command-and-control.[16]

The examination of how the information environment has influenced the command-and-control relationships among the levels of air warfare will proceed along the following lines. First, a brief sketch outlining the rise of operational art and the development of the three levels of war will set the stage. Second, a discussion of airpower specific command-and-control issues will establish a foundation for the evaluation of historical case studies. The application of airpower in the Vietnam War, Operation DESERT STORM, and Operation DELIBERATE FORCE provides the evidentiary foundation. Third, conclusions will be drawn from evidence to determine how, and to what degree the technological aspects of the information atmosphere shape airpower command-and-control. Following the conclusions, the analysis will suggest possible implications for the contemporary exercise of airpower command-and-control.

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[14] Clayton R. Newell, "What is Operational Art?" *Military Review* 70, no. 9 (September 1990): 16.

[15] United States Air Force Doctrine Document (AFDD) 1, *Air Force Basic Doctrine* (September 1997): 23. See also, Phillip S. Meilinger, *Ten Propositions Regarding Air Power* (Washington, D.C.: Air Force History & Museums Program, 1995), 49-55. Both references extol the virtues of centralized command and decentralized execution. The quest for centralized command, under the control of an airman, is one of the defining cultural characteristics of the early USAF. This cultural characteristic is manifested in contemporary airman as the struggle for autonomy. Therefore, the notion of centralized command, which still distinguishes the cultural uniqueness of USAF airmen, is pertinent to this study.

[16] Gary A. Vincent, "In the Loop: Superiority in Command-and-control," *Airpower Journal* 6, no. 2 (Summer 1992): 15-16.

Chapter 2

The Levels of War: The Rise of Operational Art

> *The discovery, perhaps the rediscovery, of operational art—the creative activity practiced at the operational level—was therefore a by-product of trying to understand the loss in Vietnam.*
>
> --Richard M. Swain

Origins of Operational Art

Historians are still debating precisely where to locate the origins of operational art. Robert M. Epstein advances the argument that Napoleon's campaigns of 1809 signaled the emergence of modern war and operational art.[17] Noted Soviet military theorist, Georgii S. Isserson presents a more widely accepted, classical view that challenges Epstein's position. Isserson asserts that Napoleon's campaigns, although featuring the initial characteristics of operational art, still firmly connected the tactical and strategic levels of war. Napoleon sought victory through a single decisive battle which was a "one-act tactical phenomenon," isolated from the cumulative nature of operations supporting a campaign.[18] Isserson argues that the origin of operational art is a twentieth century event, and he uses the history of World War I to define the birth of operational art.[19] Likewise, James Schneider argues that operational art is a post-Napoleonic occurrence. However, unlike Isserson, Schneider states that the origins of operational art can be found in the American Civil War.[20]

Regardless of their precise origin, the terms operational art and the operational level of war have only recently become fixtures in US military lexicon. American military planners have simply been slow to embrace the concepts. While this may be true, the consensus in the debate among most military historians is that the emergence of operational art was a reaction to the increased firepower on the battlefield that was

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[17] Robert M. Epstein, *Napoleons Last Victory and the Emergence of Modern War* (Lawrence, Kan.: University Press of Kansas, 1994), 177.
[18] G. Isserson, "The Evolution of Operational Art," trans. Harold S. Orenstein, in *The Evolution of Soviet Operational Art, 1927-1991: The Documentary Basis Vol. I, Operational Art, 1927-1964* (London: Frank Cass & Co., 1995), 56.
[19] Ibid., 77.
[20] James J. Schneider, *The Structure of Strategic Revolution* (Navato, Calif.: Presidio Press, 1994), 11.

largely a result of the industrial revolution. The industrial revolution and the corresponding wars of that age provide useful insight to the rise of operational art.

Pre-Industrial Revolution Warfare

Prior to the industrial revolution, the scale of war was small enough to allow a few individuals to oversee its conduct. Generals and princes usually raised armies to fight limited wars with limited objectives. There were two levels of war: strategic and tactical. Tactics dealt with the conduct of the battle proper, while strategy encompassed theater level operations.[21] Simply put, committing forces to the tactical engagement was the product of strategy. Consequently, tactical victory could often produce strategic results.

The two-level model of war was valid until the time of Napoleon, which also marked the very early stages of the industrial revolution. Although Napoleon's weapons of war were the same as earlier ages, he fought war on a greater scale than ever before. The massive conscript armies of France brought a shift in the paradigm of war. This shift was the result of logistical considerations.[22] In order to deploy and sustain a force the size of the *Grande Armee*, it was necessary to disperse and travel along different routes. Napoleon, seeking "the strategy of the single point," then would have his forces converge for the decisive battle.[23] Napoleonic warfare marks the early departure from the strategic-tactical model in two regards. First, the magnitude of the undertaking gave war a new dimension of depth. Second, no longer was the outcome of a campaign cast in a single battle. Engagements were largely sequential in route to the decisive point.[24] Part of Napoleon's legacy was the operational level and a new schematic of war, shown in Figure 1.[25]

It is important to note that military historians and strategists did not immediately recognize this distinction. Even Napoleon failed to recognize the changing nature of war and sought the single, decisive battle.[26] Although the emerging conditions representing

[21]Bruce W. Menning, "Operational Art's Origins," *Military Review* 77, no. 5 (September/October 1997): 33.
[22]Van Creveld, Command in War, 58-60.
[23] Menning, "Operational Art's Origins," 33.
[24] MacGregor, "Future Battle," 35.
[25] Ibid., 35.
[26] Epstein, *Napoleon's Last Victory*, 177.

three levels of war appear to have been present during Napoleon's time, the terminology of a two-level paradigm continued to be accepted until well into the 20th century.

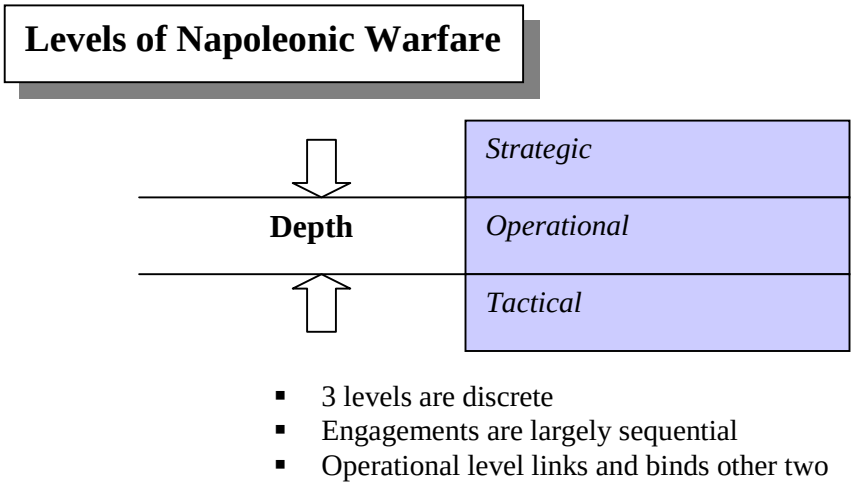

Figure 1. Levels of Napoleonic Warfare.

Industrial Age Warfare

While Napoleon may have begun to stretch apart the strategic and tactical levels of war, the Industrial Revolution is responsible for fundamentally altering the strategic-tactical view of war. The influence of the Industrial Revolution was felt in four respects.[27] First, the Industrial Revolution provided the means for mass production of goods. Mass production, translated by military utility, led to the commitment of unlimited means for waging war. Second, the age of industry gave birth to better modes of travel. Railroads and steamships meant greater mobility.[28] Third, the voracious appetite of unlimited war was finally filled. Increasing demands for war goods fell on the logistical system, which elevated the importance of supply. Fourth, as the tools of industry improved, so too did the tools of war. Improvements in weapons and combat firepower, made the battlefield a more lethal place. In fact, technology's single greatest achievement during this period was increasing combat firepower.[29]

[27] MacGregor, "Future Battle," 35
[28] Allard, *C2 and the Common Defense*, 50.
[29] Van Creveld, *Technology in War*, 265-67.

To counter the firepower improvements and survive on the increasingly hostile battlefield, forces had to disperse.[30] The disadvantage of dispersion was that it expanded the size of the battlefield, making control of forces more difficult. There was no longer a direct connection between the tactical and strategic levels of war. Increasingly complex operations brought about by Industrial Revolution strategies caused a gap to open between the two accepted levels of war.[31] Therefore, the scale of modern industrial age warfare required new levels of analysis and organization to exploit its potential.[32] Operational art provided the antidote to this problem.

Modern Operational Art

American experience with operational art came early in the industrial age during the Civil War. The scale of this conflict was enormous as advances in wireless telegraphy and the proliferation of railroads provided supply and communication improvements.[33] Unfortunately, the Union and Confederate generals were unable to see the long-term significance of their operations and they were unable to develop a language and a set of concepts that matched their technological capabilities.

The Prussians, under the guidance of von Moltke, were perhaps the first to grasp the concept of an operational level of war. Some historians consider Von Moltke to be the first practitioner of the art, citing his term of operational direction.[34] The concept of an operational level of war became obvious to von Moltke following the Battle of Koninggraetz in 1866. Despite winning a decisive victory against the Austrians, von Moltke oversaw the development of a comprehensive after-action-report assessing the results. He found deficiencies defying tactical or strategic explanation.[35] After realizing the significance of the new paradigm, von Moltke incorporated the lessons into doctrine that articulated three distinct levels of war.[36]

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[30] Allard, *C2 and the Common Defense*, 50.
[31] Menning, "Operational Art's Origins," 36-37.
[32] Hennessey and McKercher, "Introduction," 1.
[33] Allard, *C2 and the Common Defense*, 47.
[34] Michael D. Krause, "Moltke and the Origins of Operational Art," *Military Review* 70, no. 9 (Sep 90): 28.
[35] Krause, "Moltke and Op Art," 31-36.
[36] Krause, "Moltke and Op Art," 29.

Current Paradigm of Warfare

Von Moltke may have been the first formally to recognize the operational level, but operational art as known today started in the Soviet Union shortly after World War I. The Red Army took the bitter lessons of the First World War to heart, and military thinkers sought to explain the complexities of modern war.[37] The writings of men such as Tukhachevskii, Triandafillov, Svechin, and Isserson culminated in the formulation of Soviet Operational Art—Deep Battle.[38] During the Great Patriotic War, the Soviets, despite initial setbacks at the hands of the Wehrmacht were able to test, prove, and apply the lessons available at the operational level.

Meanwhile, strategists in the United States did not conceptualize the significance of operational art. That is not to say the art was not practiced. World War II campaigns in two major theaters provide experiential evidence that American generals were capable of command at the operational level of war.[39] Following World War II, the primary concerns of the United States Army were demobilization and nuclear warfare. Military thinking widely held that nuclear weapons would supplant conventional warfare. The preoccupation with nuclear weapons put operational thinking in a state of lethargy that would remain until after Vietnam.[40]

The revitalization of American operational art was a result of a post-Vietnam catharsis.[41] Stung by defeat, Army leaders worked assiduously to determine the cause of failure. Dr. Bruce Menning provides three reasons for the reemergence of operational art. First, Army leaders were trying to find out why tactical battlefield victories did not translate to strategic success. Von Moltke found a similar disparity following Koninggraetz. Second, since technology was a significant feature of the Vietnam War, they sought lessons to explain the role of technology in possible future wars. Third, and perhaps most pressing to strategists, military analysts were searching for an alternative to

[37] Menning, "Operational Art's Origins," 33.
[38] One of the best discussions on the evolution of Soviet Operational Art is found in Richard Simpkin, *Deep Battle* (London: Brassey's, 1987), 32-52.
[39] Menning, "Operational Art's Origins," 33.
[40] Hennessy, "Introduction," 1.
[41] Ibid., 3.

the Active Defense doctrine articulated in the 1976 edition of Field Manual (FM) 100-5, *Operations*.[42]

Acceptance of operational art as a doctrinal concept took place in discrete stages during the 1970s and 1980s. The 1976 version of FM 100-5 implicitly introduced the concept of operational art. The evolution of operational art continued to crystallize over the next ten years. The 1982 edition of FM 100-5 emphasized operational art through AirLand Battle and organized combat efforts into three distinct levels. The watershed year in the doctrinal evolution of operational art would have to be 1986. FM 100-5 implicitly linked the USAF to operational art by improving Army/Air Force battlefield integration under the umbrella of AirLand Battle and Follow-on Forces Attack. Additionally, Congressional action in the form of the Goldwater-Nichols Defense Reorganization Act cemented the implementation of operational art. The most notable developments springing from this landmark legislation were the increased authority of combat Commanders-in-Chief (CINCs) and the re-aggregation of joint forces. [43]

Unlike warfare in Napoleon's era, however, the levels of war are no longer discrete. Joint Publications and Air Force Doctrine Documents recognize three distinct but interdependent levels of war.[44] Areas where the levels of war overlap require greater levels of coordination and integration than were previously required. Figure 2 attempts to illustrate this point by showing the interdependence of the levels of war during Operation DESERT STORM.[45] Under this model of war, the operational level retains importance despite the encroachment of strategic and tactical influences. The reason operational art remains relevant lies in its continuing value as a warfighting concept. From the military view, operational art offers an efficient application of resources resulting in successful mission accomplishment. Politically, operational art is appealing because it offers a joint solution to security problems.[46]

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[42] Menning, "Operational Art's Origins," 42.
[43] Menning, "Operational Art's Origins," 44-45.
[44] JCS Joint Pub 3-0 *Doctrine for Joint Operations* (1 Feb 1995), II-1. AFDD 1, *AF Basic Doctrine*, 2-3.
[45] MacGregor, "Future Battle," 40.

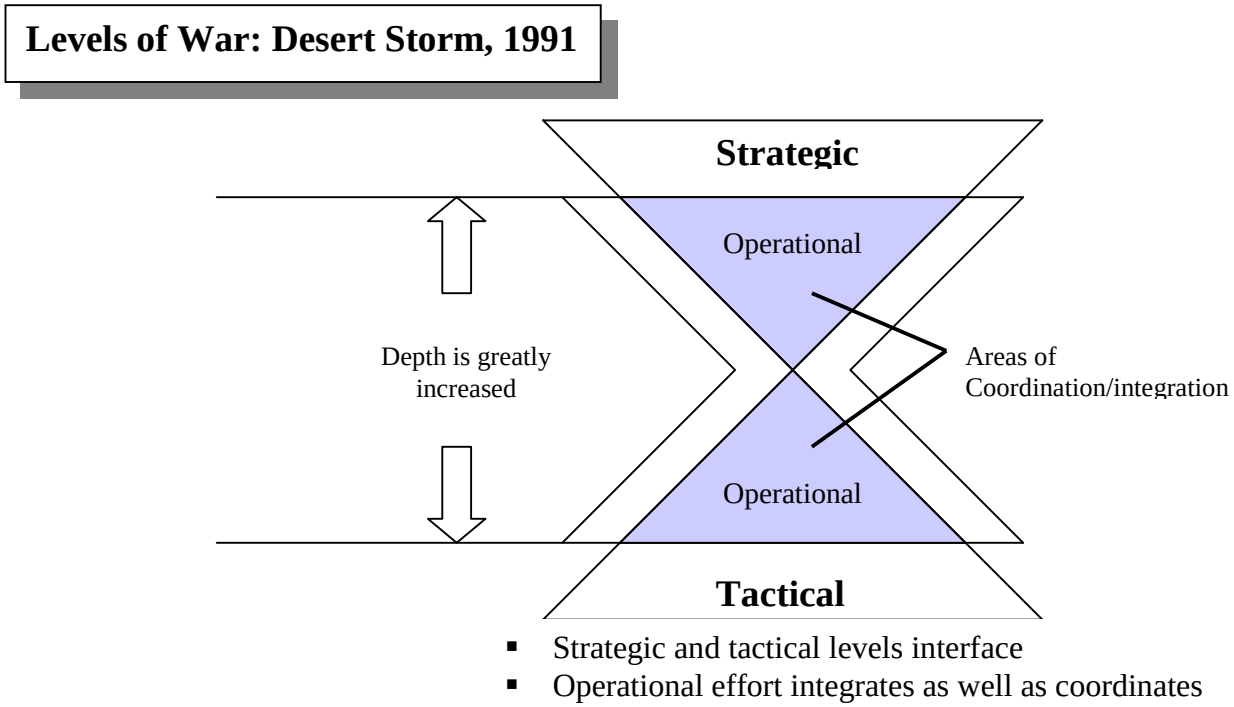

Figure 2. Levels of War during Operation Desert Storm.

Levels of Future Warfare

The levels of war have served military planners well in the past, but the relevance of the three-level hierarchy may be passing as the distinctions between the various levels erodes. The trend in warfare, fueled by technology, has been the increase of firepower and the expansion of the battlefield. It is highly probable that technology will continue to play an important role in human conflict, and it is likewise logical to assume the trend toward dispersion will continue. This means that the depth of the battlefield will increase as will the corresponding need for coordination and integration. It is, therefore, safe to assume that information technology initiatives will attempt to deal with future increases in battlefield depth and the greater need for coordination and integration. Lefebvre, Fortmann and Gongora assert:

> Information technology at the operational level will be used to synchronize integrated operations conducted at high tempo, with high lethality and high mobility throughout the depth and extent of the theater.[47]

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[46] Hennessy, "Introduction," 5.

[47] Stephane Lefebvre, Michael Fortman and Thierry Gongarra, "The Revolution in Military Affairs: Its Implication for Doctrine and Force Development within the US Army," in *The Operational Art:*

No matter how future relationships among the levels of war evolve, the preceding citation hints that information technology will play a pivotal role.

The debate on what the model of future of war will resemble breaks down into three general camps. The first group argues that the distinction between the levels of war will simply merge, another holds that the distinctions will merely blur together at the edges, and the third camp states that although the levels will compress, they will remain essentially intact.[48] While there certainly is no consensus on this issue, all parties agree that information technology will exert some degree of influence over the levels of war. In fact, as the Department of Defense migrates from the Worldwide Military Command-and-control System (WMMCS), a legacy system from the Cold War, to the newer Global Command-and-control System (GCCS), the lines between the levels of war become less distinct.[49] Regardless of which perspective is held, the three camps are more similar than different, as they seem to be arguing semantic points. Figure 3 offers a notional

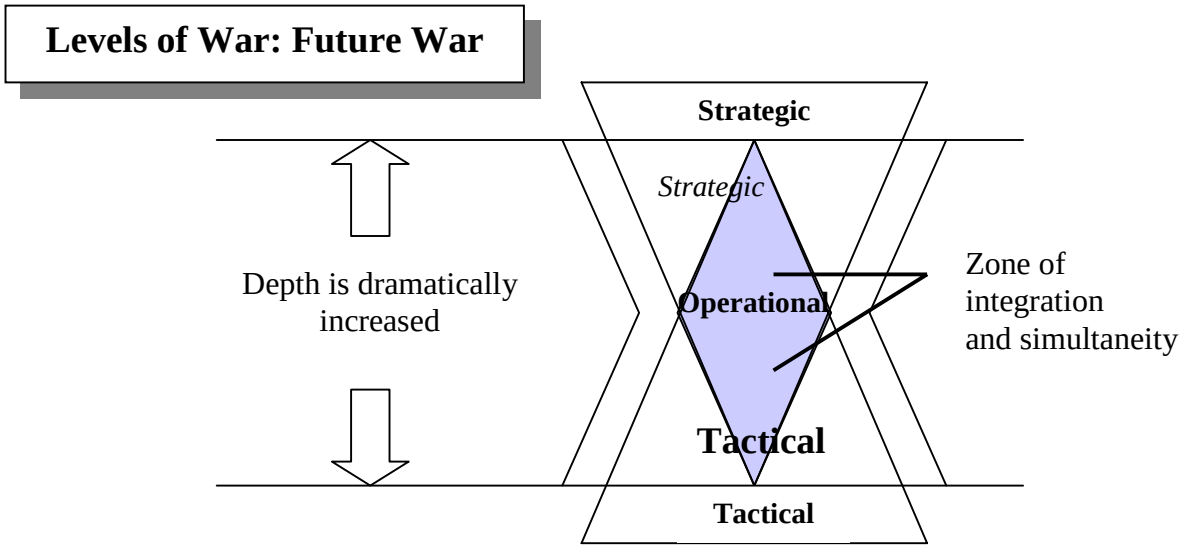

Figure 3. Levels of Future War.

Developments in the Theories of War edited by B.J.C. McKercher and Michael A. Hennessy (Westport Conn.: Praeger, 1986), 176.

[48] MacGregor represents the merger camp. For the blurred camp see; David Jablonsky, "US Military Doctrine and the Revolution in Military Affairs," *Parameters* 24, no. 3 (Autumn 1994): 18-36. Joint Publications, and hence current military thinking, advances the compressed assumption.

schematic of a model of future of war that emphasizes the interdependence between the various levels.[50]

The debate over what the future construct will look like is relevant not simply because there is debate but rather because it highlights two enduring dynamics regarding future warfare. The first point is that the depth of the battlefield, or more appropriately the battlespace, will increase. The second point commonly debated by warfare futurists is that coordination and integration will play a bigger role as the lines between the levels of war mutate. Information technology will play a major part in future war as commanders at every level grapple with issues of command-and-control. Joint Publication 3-0, *Doctrine for Joint Operations*, succinctly captures these points in the following statement:

> Advances in technology, information age media reporting and the compression of time-space relationships contribute to the growing interrelationships between the levels of war. Commanders at every level must be aware that in a world of constant, immediate communication, any single event may cut across the three levels.[51]

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[49] Joint Publication 6-0, *Command, Control, Communication, and Computer (C4) Systems Support to Joint Operations* (30 May 1995): II-11.
[50] MacGregor, "Future Battle," 41.
[51] JP 3-0, *Doctrine for Joint Operations*, II-2.

Chapter 3

Command, Control, and Airpower

"Without communications, I command nothing but my desk."
-General Paul D. Adams

The preceding chapter highlights the growth of the battlespace over time. The operational level of war evolved to span the growing split between strategy and tactics. Operational art constitutes the physical manifestation of combat activities at the operational level. Likewise, as the scope and scale of war have increased, commanders needed a mechanism that allowed them to span the entire battlespace in order to orchestrate the battle.[52] It is the conduct of these combat activities that generates the need for command-and-control. Command-and-control is the mechanism of orchestration, while communications offer the means. Therefore, this chapter will define the concept of command-and-control by disaggregating the terms and distilling the pertinent features of both the notion of command and the notion of control. Then, by synthesizing command with control, a working definition of command-and-control that is particular to the application of airpower will emerge.

Command

The collection of literature on military command is immense. The sheer volume boggles the mind and makes it difficult to determine a concise definition. However, Joint Publication 1-02, *DOD Dictionary of Military and Associated Terms*, offers a useful starting point in the development of a working definition of command. It defines command as:

> The authority that a commander in the Armed Forces lawfully exercises over subordinates by virtue of rank or assignment. Command includes the authority and responsibility for effectively using available resources and for planning the employment of, organizing, directing, coordinating and

[52] I.B. Holley, Jr. "Command, Control and Technology," *Defense Analysis* 4, no. 3 (September 1988): 268.

> controlling military forces for the accomplishment of assigned missions. It also includes responsibility for health, welfare, morale, and the discipline of assigned personnel.[53]

This definition offers a checklist approach to command. It is, however, too bulky and cumbersome to be of much use during this study. Therefore, it becomes necessary to extract a more applicable definition from sources on the subject of command. Martin van Creveld refers to command as a, "function that has to be exercised more or less continuously if the army is to exist and operate."[54] While command is doubtless a function to be exercised, van Creveld's definition also makes command appear mechanical or automatic. Command is a human attribute, and any definition of the topic must incorporate its human dimensions. Noted historian I.B. Holley asserts that command involves perceiving and deciding.[55] This definition captures the human essence of command and also implies the need to gather information that powers a decision making process.[56] However, perceiving and deciding fall short of capturing the more complete nature of command, as they portray command as an input-only function. From the Holley definition, it is reasonable to presume that information is essential to command. In fact, this is recognized in joint publications. Joint Publication 6-0, *Doctrine for Command, Control, Communication, and Computer (C4) Systems Support to Joint Operations*, states that "command is as much a problem of information management as it is of carrying out difficult and complex warfighting tasks."[57] The information input to the command decision process is only one side of the equation.

A comprehensive definition of command requires an output. Canadian behaviorists Carol McCann and Ross Pigeau provide an output-driven definition of command as, "the creative expression of human will necessary to accomplish the mission."[58] Again, this

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[53] Joint Pub 1-02, *DOD Dictionary of Military and Associated Terms*, 23 March 1994, 84-85.
[54] Van Creveld, *Command in War*, 5.
[55] Holley, "Command, Control and Technology," 268.
[56] Similar to this definition is Col. John Boyd's Observe-Orient-Decide-Act (OODA) Loop discussion. See John R. Boyd "A Discourse on Winning and Losing," Briefings (Maxwell AFB, Ala.: Air University Document M-U 43947, 1987), 134. Also "Organic Design for Command-and-Control," Briefings (Maxwell AFB, Ala.: Air University Document M-U 43947, 1987), 1.
[57] JP 6-0, *C4 Systems Support*, I-1.
[58] Carol McCann and Ross Pigeau, "Clarifying the Concepts of Control and of Command," in Command-and-Control Research and Technology: Proceedings of Symposium in Newport, Rhode Island, June 29 – July 1, 1999 (Newport, R.I.: US Naval War College, 1999), 5.

definition is only a partial expression of command and needs aggregation with the salient points from other definitions. It is possible to ascertain these salient points by finding the three trends present in the literature on command. The first trend implies that command is a process comprising human attributes. Regardless of how one defines command, it centers on the human element. In any command process, the human cannot operate in a vacuum. The commander requires inputs on which decisions can be made and an output mechanism to express command prerogatives. The process and decisions become highly interactive.[59] Therein lie the second and third trends. There is an input and output connected to the command process. This construct of command is graphically depicted in Figure 4.

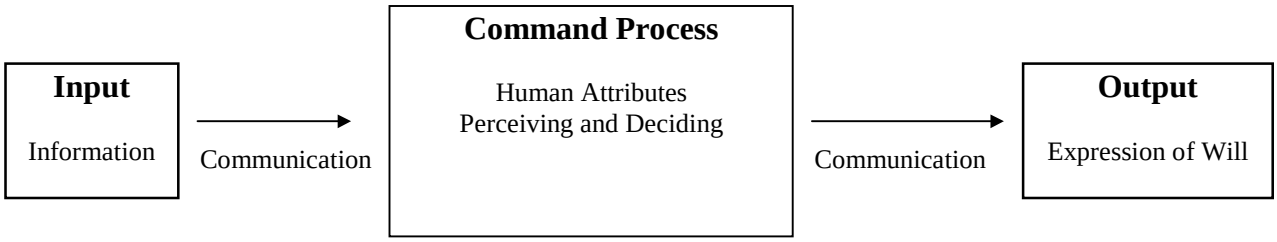

Figure 4. Preliminary Definition of Command.

A synthesis of the various command definitions provides a preliminary definition. Based on this synthesis, one may define command as "the uniquely human process of receiving and processing information from which a decision can be made and subsequently transmitted in order to accomplish a given activity." This working definition of command makes the human role in command central and underscores the value of communication.

Control

Joint Publication 1-02 also provides the starting point for developing a working definition of control. This manual defines control as "authority which may be less than full command exercised by a commander over part of the activities of subordinate or

[59] Carl H. Builder, Steven C. Banks and Richard Nordin, *Command Concepts: A Theory Derived from the Practice of Command-and-control* (Santa Monica, Calif.: RAND, 1999), 3.

other organizations."[60] Like the joint definition of command, the description of control does not suit the needs of this study, and assessing the body of literature on the subject can forge a more appropriate working definition. Whereas command takes the form of art, control borders closely on the realm of science. One source holds control to be:

> [The] science of defining limits, computing requirements, allocating resources, prescribing requirements for reports, monitoring performance, identifying and correcting deviations from guidance and directing subordinate actions to accomplish the commander's intent.[61]

This checklist approach to the process is less than satisfactory. I.B. Holley offers a less rigorous structure in which he describes the function control, "to involve the communication of the commander's decision to his subordinate echelons, followed by continuous monitoring, not only to ensure compliance but to coordinate actions."[62] Another approach claims that the function of control is to reduce uncertainty, manage risk, and increase the speed of response time. Control accomplishes these tasks by constraining the problem of space, and by imposing order.[63] Examining the trends in control literature illustrates three consistent themes. First, control involves communicating the output of the command process, typically as expression of intent. Second, control requires feedback that returns to the command process as input. Therefore, control implies aspects of both a feedback and a monitoring loop. Third, control cannot occur without communication. Distilling these trends provides a working definition of control as "communicating intent and adjusting actions to ensure mission success." Again, this definition will provide the basis for the present study.

In the evolutionary rise of control, there is a direct correlation between the increasing size of military forces and the increasing use of technology. Taking this one step further, the direct application of technology facilitates the ability to control.[64] The dependencies

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[60] JP 1-02, *Dictionary of Military Terms*, 99.
[61] Leonard P. Wishart III, "Leader Development and Command-and-control," Military Review 77, no. 1 (January/February 1997): 63.
[62] Holley, "Command, Control and Technology," 268.
[63] Ross Pigeau and Carol McCann, "Putting 'Command' Back into Command-and-control," in Command-and-Control: Proceedings of Conference in Ottawa, Ontario, Canada, September 25, 1995 (Ottawa, ON: Canadian Defence Preparedness Association, 1995), 4-5.
[64] Ibid., 5.

of control on technology and command on communication provide the foundation for developing the aggregated definition of command-and-control.

Command-and-Control

The joint definition of command-and-control appears to be a mere aggregation of joint definitions of the two terms. Command-and-control is defined as:

> The exercise of authority and the direction by a properly designated commander over assigned and attached forces in the accomplishment of the mission. Command-and-control functions are performed through an arrangement of personnel, equipment, communications, facilities, and procedures employed by a commander in planning, directing, coordinating, and controlling forces and operations in the accomplishment of the mission.[65]

The above, amalgamated definition also appears to place primary emphasis on control, at the expense of command. One of the most striking examples of this emphasis comes from Alvin and Heidi Toffler. They define command-and-control as the "system by which authority and direction are exercised by the legitimate commander."[66]

Command-and-control should be seen as a process, not necessarily as a system. While command-and-control actions rely on communication systems to operate, these key enablers should not be the defining parameters. Communications networks serve merely to facilitate command-and-control. Communication systems allow the authority of command to be extended over distance.[67] The working definition that evolves from this discussion can be found through synthesis of the component definitions. Therefore, command-and-control can be thought of as the "expression of the commander's will and intent." The commander's will and intent emerge as output from the decision process shown in Figure 4. However, since command-and-control is not a static process, some mechanism to monitor compliance and react to environmental changes should be present. This mechanism can take the form of a feedback or monitoring loop. As the control

[65] JP 1-02, *Dictionary of Military Terms*, 85.
[66] Alvin and Heidi Toffler, *War and Anti-War* (New York: Warner Books, 1993), 165.
[67] Beaumont, *Nerves of War*, 8.

mechanism senses information, it can be channeled back into the process as an input. Figure 5 schematically illustrates this updated definition of command-and-control.

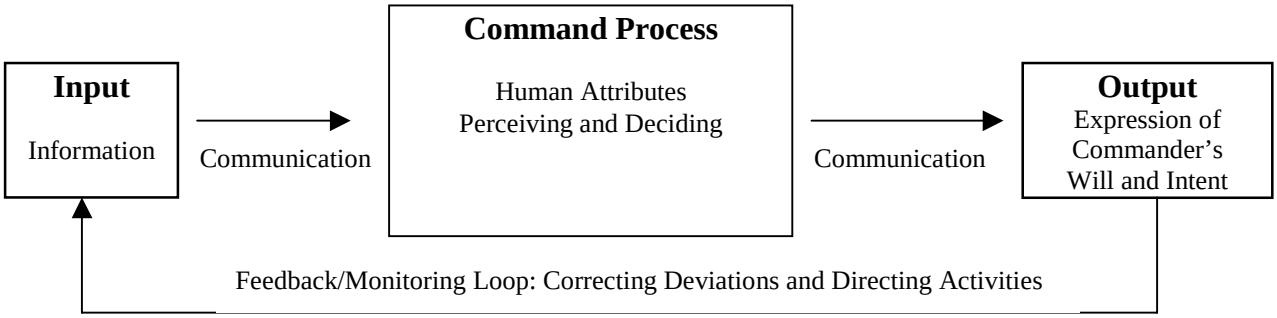

Figure 5. Depiction of Command-and-Control.

Command-and-control of Airpower

Thus far, the definition of command-and-control is generic, applicable to any form of military power. Van Creveld asserts that the historical challenges of command are a function of the size, numbers and purpose of armed forces, as well as the size of the battlespace.[68] While this appears to be true, it provides only a general statement on the command and subsequent control of military activity. Therefore, it is important to identify the unique characteristics that distinguish the command-and-control of airpower. These characteristics, unique to the application of airpower, will be examined by discussing what makes airpower different from other forms of military power, why it is different, and what impact that may have on the command-and-control of airpower.

What differentiates airpower from other forms of military power? According to C. Kenneth Allard, airpower has three particular characteristics that distinguish it from other forms of military force. These aspects are the operational environment; the strategic paradigm; and, especially in the case of the USAF, the quest for service autonomy.[69] The operational environment consists of two features that distinguish airpower. They are the

[68] Van Creveld, *Command in War*, 6.
[69] Allard, *C2 and the Common Defense*, 243-45.

medium of airspace and the span of control. The strategic paradigm of airpower also has two primary features. The first is the formulae, or prescriptions for victory that are inherent to airpower. The second is the strategic effect of airpower. The third aspect, service autonomy, is a reflection of the psychology of airmen and their quest for organizational independence.

In terms of operational environment, perhaps the dominant feature contributing to the uniqueness of airpower is the medium of operations. Air Force Doctrine Document 1, *Air Force Basic Doctrine*, succinctly captures this feature by stating that, "airpower is intrinsically different from either land or sea power because of its three dimensional medium."[70] The following citation lends support to this claim:

> Land power and aerospace power share the same objective, then—compelling enemies to do things—and differ only in their means and methodologies. Land forces compel enemies through maneuver, fire and presence operations by forces that move on the surface of the Earth… Aerospace forces compel enemies through maneuver, fire, and presence operations by forces that move above the surface of the Earth… In simple terms, then air and land forces do similar things in different mediums.[71]

Other airpower experts offer additional features that make airpower unique. Conrad C. Crane asserts that "we see air warfare as being different only in the range of its potential destruction."[72] Still others hold that the speed, transience, and flexibility distinguish airpower from other forms of military force. While these are characteristics of airpower, noted airpower expert Dennis M. Drew does not think they are unique to the air perspective. Drew posits that the features noted by Crane and others are unique only in a relative sense. Furthermore, he states that the only unique characteristic of airpower is the ability to sustain operations at some elevation above the Earth's surface.[73] The unique ability to operate above the surface of the Earth enables the unique capability or essence of airpower.

> That unique capability, the essence of airpower, is two-fold. First, only airpower can mass great power quickly over any spot on the planet.

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[70] AFDD 1, *AF Basic Doctrine*, 22.
[71] Robert C. Owen, "Aerospace Power and Land Power in Peace Operations: Toward a New Basis for Synergy," *Airpower Journal* 13, no. 3 (Fall 1999): 12.
[72] Conrad C. Crane, *Bombs, Cities, and Civilians: American Airpower Strategy in World War II* (Lawrence, Kan.: University Press of Kansas, 1993), 163.
[73] Dennis M. Drew, "Joint Operations: The World Looks Different from 10,000 Feet," Airpower Journal 2, no. 3 (Fall 1988): 15.

> Second, only airpower can apply great power quickly to any tangible target on the planet.[74]

Therefore, it would seem that the medium of operations is the source of airpower versatility. Versatility, taken "from the fact it [air and space power] can be employed equally effectively at the strategic, operational, and tactical levels of warfare."[75]

Another feature of the operational environment that distinguishes airpower is the span of control, which is essentially the number of combat elements, or more concisely, moveable subordinate entities. Combat power in the air is generally a measure of the number and types of aircraft available. On the sea, it is quantified as ships and submarines. Tanks, vehicles and soldiers comprise some of the major land-force, moveable subordinate entities. Because aircraft are usually more expensive than land weapons systems, they are acquired and employed in smaller numbers. In short, the span of control from the operational air commander to the tactical subordinate elements is typically smaller than that of ground forces. Figure 6 gives a comparison of service elements as relevant to command-and-control. Since the USAF and, to a greater degree, the US Navy are platform-centric in the approach to war, there are far fewer subordinate elements that must be influenced through command-and-control. Figure 6 also provides service-specific trend information on certain command-and-control dynamics. In particular, because of the smaller number of tactical level units, air commanders have better communications connectivity with subordinates and can therefore express information more precisely than their ground-force counterparts. Service organizational differences also allow air commanders to centralize control of airpower.

Consequently, the relatively small span of control at the operational level becomes a defining characteristic of airpower command-and-control. At the national or strategic level a unique feature of airpower appears to be the political predisposition to employ airpower as a military force of first resort. One of the most noteworthy contemporary analysts of airpower, Dr. Eliot Cohen, captures this nicely by stating, "more than most other forms of military power, politicians find air power easy to manipulate, to employ or

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[74] Drew, Dennis M, Interview with Author, 14 March 2000, School of Advanced Airpower Studies, Maxwell AFB, Ala. These sentiments are echoed in Professor Drew's SAAS Briefing "The Essence, Reality, and Dilemma of Airpower: Building a Modern Airpower Theory."
[75] AFDD 1, *AF Basic Doctrine*, 24.

withhold…."[76] The ease with which airpower can be controlled by strategic decision-makers can also be considered a unique feature and one that adds to the 'mystique' of airpower. Again, Cohen seems to describe the strategic culture accurately by observing that; "air power is an unusually seductive form of military strength, in part because, like modern courtship, it appears to offer gratification without commitment."[77]

Dr. Allard uses the term strategic paradigm to describe the conceptual beliefs of an organization. In the case of the USAF, strategic paradigms provide both the prescriptions for victory and formulae for organization. In particular, he argues that the theoretical writings of the Italian airpower advocate Giulio Douhet shape the USAF to this day.[78] In his seminal work, *The Command of the Air*, Douhet writes that the new medium of air requires a new and independent service on equal footing with the other armed forces of the nation. He also states that the airplane is the ultimate offensive weapon that should be used for strategic effect.[79] The contemporary writings of John Warden update the strategic paradigm and distinguish airpower from other forms of force.[80] Warden uses a metaphorical construct of war that portrays the enemy as a living organism.

[76] Eliot A. Cohen, "The Meaning and Future of Airpower," *Orbis* 39, no. 2 (Spring 1995): 197.
[77] Eliot A. Cohen, "The Mystique of U.S. Air Power," *Foreign Affairs* 74, no. 1 (Jan/Feb 94): 109.
[78] Allard, *C2 and the Common Defense*, 244.
[79] Guilio Douhet, The Command of the Air, trans. Dino Ferrari (Washington, D.C.: Office of Air Force History, 1983), 9-18.
[80] John A. Warden III, *The Air Campaign* (Washington, DC: Brassey's, 1989), 1-9.

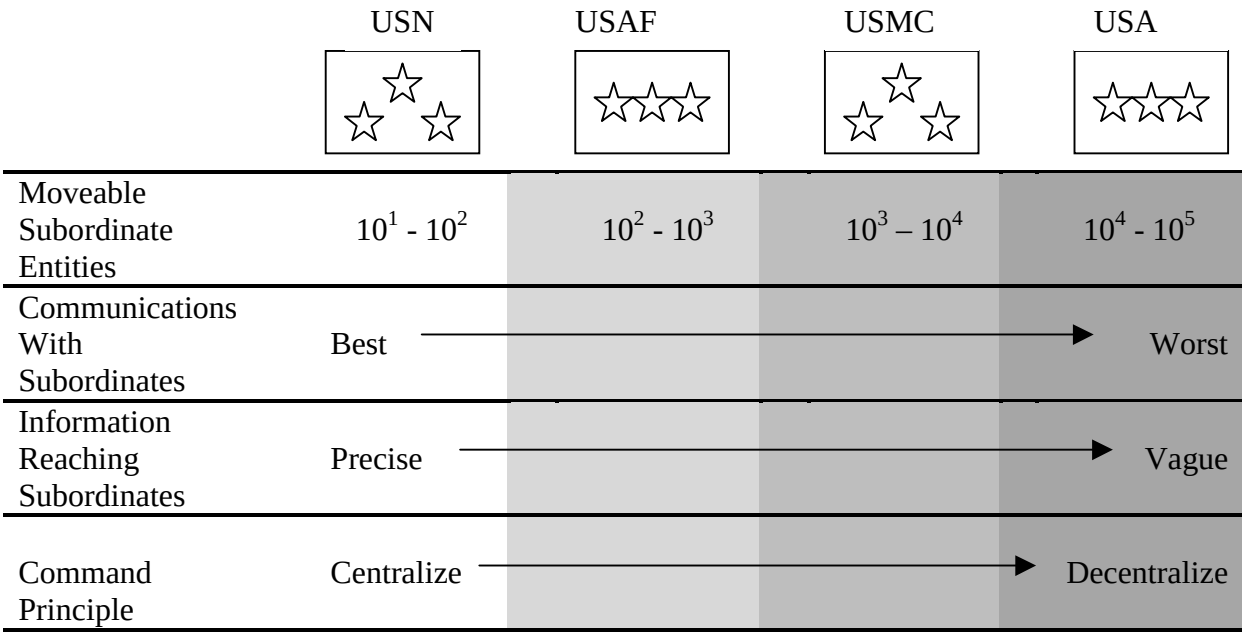

Figure 6. Service Organizational Differences: Command-and-Control.

The Warden model then uses the vital systems of this organism to build a five-ring model with the outside ring being the military forces and the innermost ring the enemy's strategic leadership.[81] The distinctiveness of airpower in the Warden model is that the requirement for sequential attack is absent. Ground forces typically must start at the outside ring and progress sequentially to the first ring representing enemy leadership. Airpower can attack any of the rings at the time and place of best advantage. This capability helps to explain why many airmen extol the strategic virtues of airpower.[82] Not only can airpower have immediately apparent strategic effects, but also this characteristic shapes the command principle of airpower. Since airpower is strategic in impact, it often requires centralized control.[83] Eliot Cohen echoes this last sentiment: "the history of airpower, particularly in the United States and the United Kingdom, is a story of centralization, the welding of air forces into mighty, concentrated instruments of power."[84]

[81] John A. Warden III, The Enemy as a System," *Airpower Journal* 9, no. 2 (Spring 1995): 42-49 .
[82] Meilinger, *Ten Propositions,* 8-13.
[83] Michael Straight, "Commander's Intent: An Aerospace Tool for Command-and-control?" *Airpower Journal* 10, no. 1 (Spring 1996): 41.
[84] Cohen, "The Meaning of Air Power," 194.

The third aspect that distinguishes airpower deals with service autonomy. Early advocates of American airpower sought an independent service to utilize the newest weapon of war most effectively. They argued vehemently that only airmen could appreciate the value of airpower and were therefore the only ones capable of commanding and controlling the air arm. This struggle for autonomy continues to this day. While the USAF is no longer struggling to establish itself as an independent service, it is fighting to maintain and expand its freedom of action.[85]

The preceding discussion attempts to detail features that make airpower different from other forms of military power, especially from ground forces. The following discussion will focus on why airpower has unique characteristics with relevance to command-and-control. There appear to be two prominent reasons that explain why the command-and-control of airpower differs from other forms of command-and-control. They are structure and effect. Structure resides in the physical composition of command channels, and in the case of most military organizations, they follow hierarchical patterns. The differences in command structures between the US Army and USAF are evident by the two organizations' use of the concept of commander's intent:

> Commander's intent has helped [ground forces] preserve the tempo of operations despite span of control challenges created by increasing size of armies over the centuries. Air forces have a less traditional combat organization through which battlefield control often does not accompany unit command.[86]

The above observation implies that not only is airpower's span of control smaller, but that the command-and-control processes do not directly flow down the traditional chain of command. In other words, for ground forces the commander's will and intent is expressed from the Joint Force Land Component Commander (JFLCC), to the Corps, Division, Brigade, Battalion, Company, Platoon, Squad and eventually to the individual soldier. In the airpower example, guidance passes from the Joint Force Air Component Commander (JFACC), to the Air Operations Center (AOC), and then directly to the pilot leading the mission. In essence, the airpower command-and-control process eliminates interaction by the Wing, Group, and Squadron Commanders. Figure 7 provides a typical

[85] Carl H. Builder, *The Masks of War* (Baltimore, Md.: John Hopkins University Press, 1989), 27-28.
[86] Straight, "Commander's Intent," 41.

example of an air force chain of command, illustrating the short line from the operational level to the tactical level.[87]

The important point to make is that while the scope of airpower may be global and time constrained, there are fewer intermediate levels of command between the operational level and the tactical elements of air warfare. [88] Because of this, airpower command-and-control lends itself to a higher degree of centralization than can be anticipated with the employment of ground forces. Operational level control of airpower implies that there is less opportunity for theater air commander's to use the concept of commander's intent, a traditional tool of ground commanders. Airpower intent and decentralization take form in the Air Tasking Order.[89]

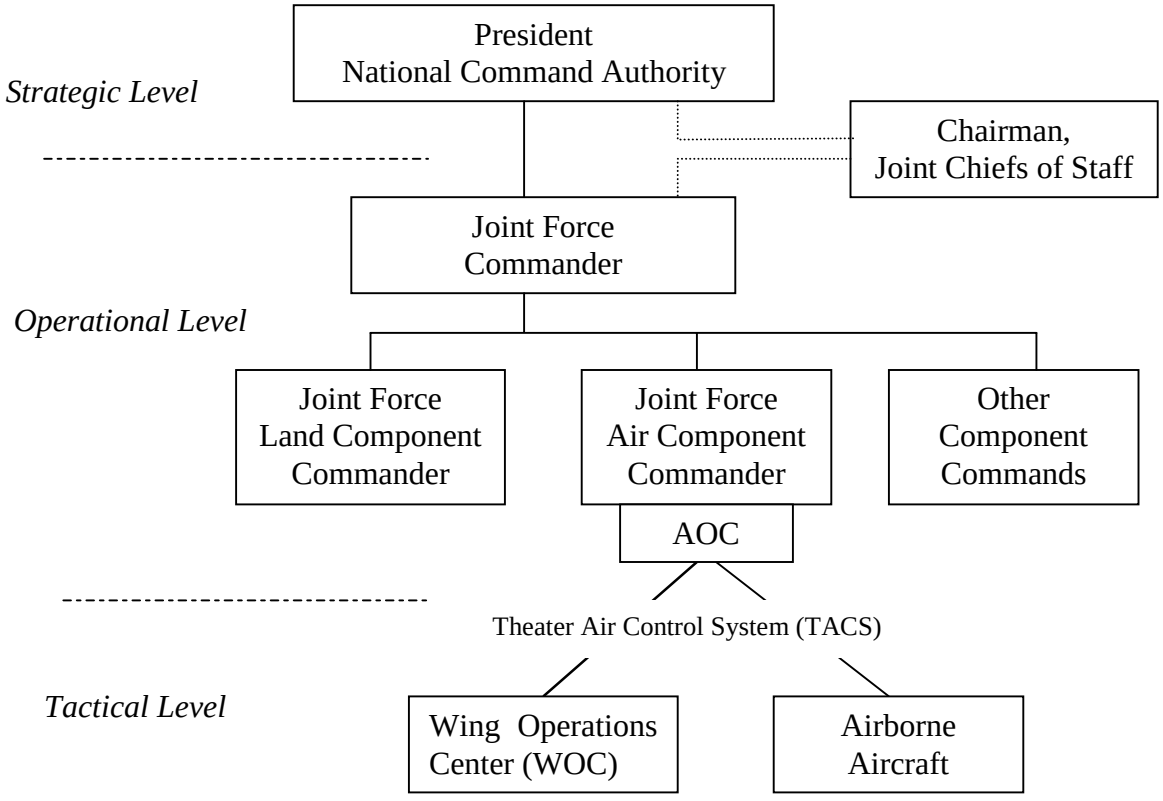

Figure 7. Notional Airpower Command-and-control Channels.

[87] Adapted from JP 3-0, *Doctrine for Joint Operations*, II-1-5 and Joint Publication 3-56.1, *Command-and-control for Joint Air Operations* (14 November 1994), II-1-12.
[88] Drew, "The World Looks Different," 9.
[89] Straight, "Commander's Intent," 41-42.

In summary, examining the characteristics of airpower command-and-control suggests several possible conclusions regarding the differences between the exercise of command in the air and on the ground. First, in terms of structure, the operational level air commanders operate with a smaller span of control than does his ground counterpart. This arrangement leads to an organization comprising fewer subordinate elements between the operational commander and the tactical application of airpower. Second, the versatility of airpower indicates that it may possess immediately apparent strategic effects. That is not to imply that ground power cannot be used for strategic effect, merely that airpower can affect strategic level concerns more directly. The two conclusions seem to support airpower's greater use of centralized command-and-control. The possible implications of centralization are far reaching. Not only can one command-and-control airpower from the operational level; but also as information technology improves, it may become possible to employ airpower directly from the strategic level.

Command, Control, and Information Technology

Having established a functional, human definition of command-and-control and having investigated several of the properties that make command-and-control of airpower distinctive, it is now possible to move on to the question of how modern information technology has affected the airpower command-and-control process. One must begin such an investigation with the obvious assertion that the purpose of integrating new technologies into the airpower command-and-control process should be to facilitate mission accomplishment. The potential for such facilitation has been widely noted:

> The explosive growth of automation and information management capabilities provides vastly improved control and staff support systems. This plus new communication capability provides incredible techniques for improved command-and-control.[90]

The improved ability to communicate, and therefore effect command-and-control, should define the relationships among the levels of air war. This does indeed seem to be the case. Since communication is the mechanism of command-and-control, the transfer of information serves as a starting point for assessing the influence of information

[90] Wishart, "Leader Development and C2," 63.

technology on airpower command-and-control. Subject matter experts point to several trends in command-and-control that are being shaped by information technology.

The first trend centers on the theme of information availability. How much information is needed? Van Creveld examines one end of the spectrum, in which the demand for information outstrips the ability to transmit it, resulting in long decision-cycle times for planning and executing operations. This was especially evident during the Vietnam War.[91] The opposing view holds that improvement in information technology has changed the equation. Supply now exceeds demand, so commanders can have more than the information necessary to conduct operations. Using modern systems, which are capable of transmitting vast quantities of information, subordinates, ever anxious to please their superiors, will push massive amounts of information through communication channels. Inundating commanders with information can lead to overload. Like the scenario with insufficient information, information overload can impede the decision making process.[92]

The second trend deals with information distribution. Improved sensors and reporting systems pervade the battlespace. The volume of communication traffic generated by the improved sensing and reporting node on the modern battlefield requires processing at a centralized location. Consequently, locations such as the Air Operations Center (AOC) or command vehicle become the terminus of communication. This shatters the existing paradigm that those at the tactical level, those closest to the battle, have the best information. According to Captain Robert L. Bateman, US Army, "for the first time in history, the frontline commander actually knows less about what is going on in his immediate area that does his higher commander."[93] It now appears that the operational level command facility has become a dominant node in the C2 information distribution system.

A consequence of the preceding trend, the third trend revolves around the command decision-maker, i.e., who acts on the information? If a more accurate picture of the battlespace exists with the higher commander, it is natural to assume decisions should be

[91] Van Creveld, *Command in War*, 247-49.
[92] Charles L. Donnelly, Jr., "An Air Commander's View of Operational Art," *Military Review* 70, no. 9 (September 1990): 83.

made at a higher level. Taking this logic to an extreme, it is possible to imagine strategic level commanders making decisions traditionally reserved for tactical leaders. Not only would strategic level commanders centralize the flow of information and decision-making, but they could also conceivably remove the intermediate-level commanders from the chain of command. This phenomenon, known as a "skip-echelon," allows higher authorities to override commanders on the scene of operations.[94]

The trends in information technology can therefore be summarized as having the following influences on command-and-control. First, information technology no longer appears to be the limiting feature of a C2 system. Information inadequacy may have given way to information overload. This phenomenon however may have brought with it its own problems. The end result remains that the quantity of information, either too much or not enough, can increase the decision-making time cycle. Second, the evolution of information technology tends to bring about increasing centralization. Battlespace awareness seems to be migrating away from the frontline and into the command center. Third, the traditional chain of command hierarchy may be losing its relevance as information technology improves the means through which air commanders express their will and intent. The classical flow of command prerogatives from the strategic, to the operational, and ultimately the tactical level of war, may become an issue of concern. In particular, the issue may be the extent to which the authority of intermediate level commanders has been affected by emerging information technologies. The next section of this paper will examine historical evidence in the application of airpower to determine how information technology has influenced the flow of information within the levels of war hierarchy.

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[93] Robert L. Bateman, "Force XXI and the Death of Auftragstaktik," *Armor* 105, no. 1 (January-February 1996): 14.
[94] Beaumont, *Nerves of War*, 22.

Chapter 4

Case Studies in the Command-and-control of Airpower

The hardest thing I have to do is nothing. There is a terrible temptation to interfere.
--General George S. Patton Jr.

The intent of the previous two chapters has been to build a foundation from which it is possible to assess the command-and-control of airpower during combat employment. Chapter 2 provided a model of war while Chapter 3 highlighted several some of the unique aspects in the realm of airpower command-and-control. Three important points require emphasis here. First, the emergence of the operational level of war, which created the current three-level model, was a consequence of attempts to exercise authority over combat forces in an ever-growing battlespace. Second, the importance of communication to exercise this authority is pervasive. Third, while some observers tend to think of C2 as merely a system, it is the human element that makes command-and-control possible.

The purpose of this study is to determine if, and how, improving information technology is influencing the command-and-control of airpower. Under the traditional three-level paradigm, communications travel between the levels as shown in Figure 8.

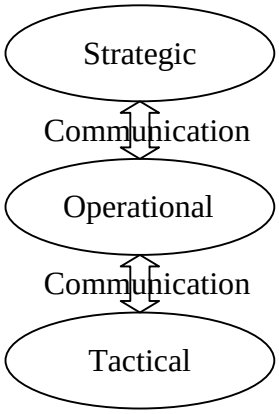

Figure 8. Communication Among the Levels of War.

The operational level is important because under the currently accepted model it serves as a focal point of communications between the strategic and tactical levels. If information technology is having an influence on the levels of war, it is reasonable to expect the communication relationships between these levels to change. In particular, do improvements in information technology allow the strategic and tactical levels to bypass the operational level during the command-and-control of airpower? Figure 9 shows a notional example of direct communication from the strategic to the tactical level.

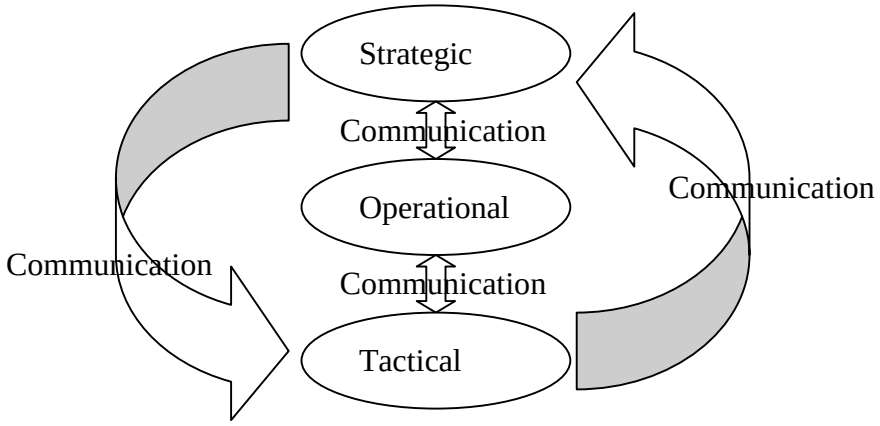

Figure 9. Multi-Level Communication.

As information technology improves, strategic leaders may become more willing to intervene in tactical events. Perhaps the best example of direct communication between strategic leaders and tactical operators can be found in Operation EAGLE CLAW, the disastrous 1980 Iranian Hostage Crisis rescue attempt. Although other major planning and execution errors certainly contributed, the heavy hand of strategic leadership in the tactical execution of the operation was instrumental in its ultimate failure. This tragic event illustrates the potential danger present when strategic decision-makers, far removed from the battlespace, attempt to influence tactical operations.[95] I.B. Holley succinctly captures the sentiment of the issue with the following statement. "A peculiar feature of command and control is that as technological capabilities increase there is a corresponding requirement for user discipline. Improved means have lead to abuse."[96]

[95] Beaumont, *Nerves of War*, 22.
[96] Holley, "Command, Control and Technology," 281.

However, it is important to note that command-and-control is not entirely a function of information technology. As previously noted, command-and-control is a human endeavor. Therefore, to assess the impact information technology has on the command-and-control of airpower it is necessary to isolate the influence of the human dimension. To the greatest extent possible, isolating the human element will occur by assessing how commanders at various levels of war influence communication.

Dr. Thomas Czerwinski offers a method for handicapping communication down the chain of command. Czerwinski uses the term "command environment" to describe a leadership style that keeps superiors from over interference in the affairs of subordinates. While there may be times when the strategist is justified in interfering in, or at least having a direct interest in tactical details, over management can adversely effect operations. A superior's monitoring or feedback efforts may be mistaken for interference, thus complicating the dynamic of intervention by higher authority. In such cases, the command environment serves as a buffer between the levels of war by acting as a barrier, or at least an obstacle, to excessive interference by superiors.[97] The command environment essentially indicates the likelihood of a given senior commander to interfere in the affairs of subordinates. Moreover, the command environment can imply the likelihood that a given strategic-level leader might skip-echelon and intervene at the tactical level.

In terms of communication up the chain of command, Carl Builder provides a tool that helps isolate the human element. Builder, Steven Banks, and Richard Nordin advanced the notion of a "command concept." Command concept is the "commander's vision of a military operation that informs the making of command decisions."[98] Builder and associates hold that the problem with contemporary command-and-control is that too much information is transmitted to higher levels.[99] This sentiment, echoed as one of van Creveld's information pathologies, uses heavy communication traffic as a sign of a failed

[97] Thomas J. Czerwinski, "Command-and-control at the Crossroads," *Marine Cops Gazette* 79, no. 10 (October 1995): 15.
[98] Carl H. Builder, Steven C. Banks, and Richard Nordin, *Command Concepts: A Theory Derived from the Practice of Command-and-control* (Santa Monica, Calif.: RAND, 1999), iii.
[99] Ibid., 1.

command concept. If subordinates understand the command concept, they should know what the commander needs and not blindly push data through the C2 system.[100]

The following methodology will be used to examine the influence of information technology on the command-and-control of airpower. First, case studies from Vietnam, the Persian Gulf War, and Operation DELIBERATE FORCE will provide the evidentiary basis for evaluation. During examination of the case studies, efforts to determine the impact of information technology will focus on significant operations or events that highlight the dynamics of communication on command-and-control. The second step will be to establish the atmosphere of command during the case study. The command atmosphere is the synthesis of command environment and command concept. The goal is to identify the influence of the commanders in order to determine the influence of the technical means of command-and-control. The third step will be to specify the command relationships prevalent during the case study in an attempt to determine how the actual mechanisms of command-and-control functioned. Then, finally, it should be possible to determine how, if at all, information technology has influenced the command-and-control of airpower.

Vietnam

Airpower involvement in Vietnam is a long chapter in American history, covering the tenure of four presidents. Consequently, it becomes difficult to study the entire conflict. To narrow the scope, this case study will examine command-and-control of airpower during four significant events: FLAMING DART, ROLLING THUNDER, the TET Offensive, and the LINEBACKER campaigns.

Chain of Command

The chain of command evolved throughout the Vietnam conflict. For the sake of simplicity, a representative command structure will serve to illustrate the germane points. Although the United States military did not yet formally recognize operational art and the

[100] Builder, *Command Concepts*, 122.

operational level of war, the command structure can be broken into the contemporary three-level model. Figure 10 provides a graphic representation of American command

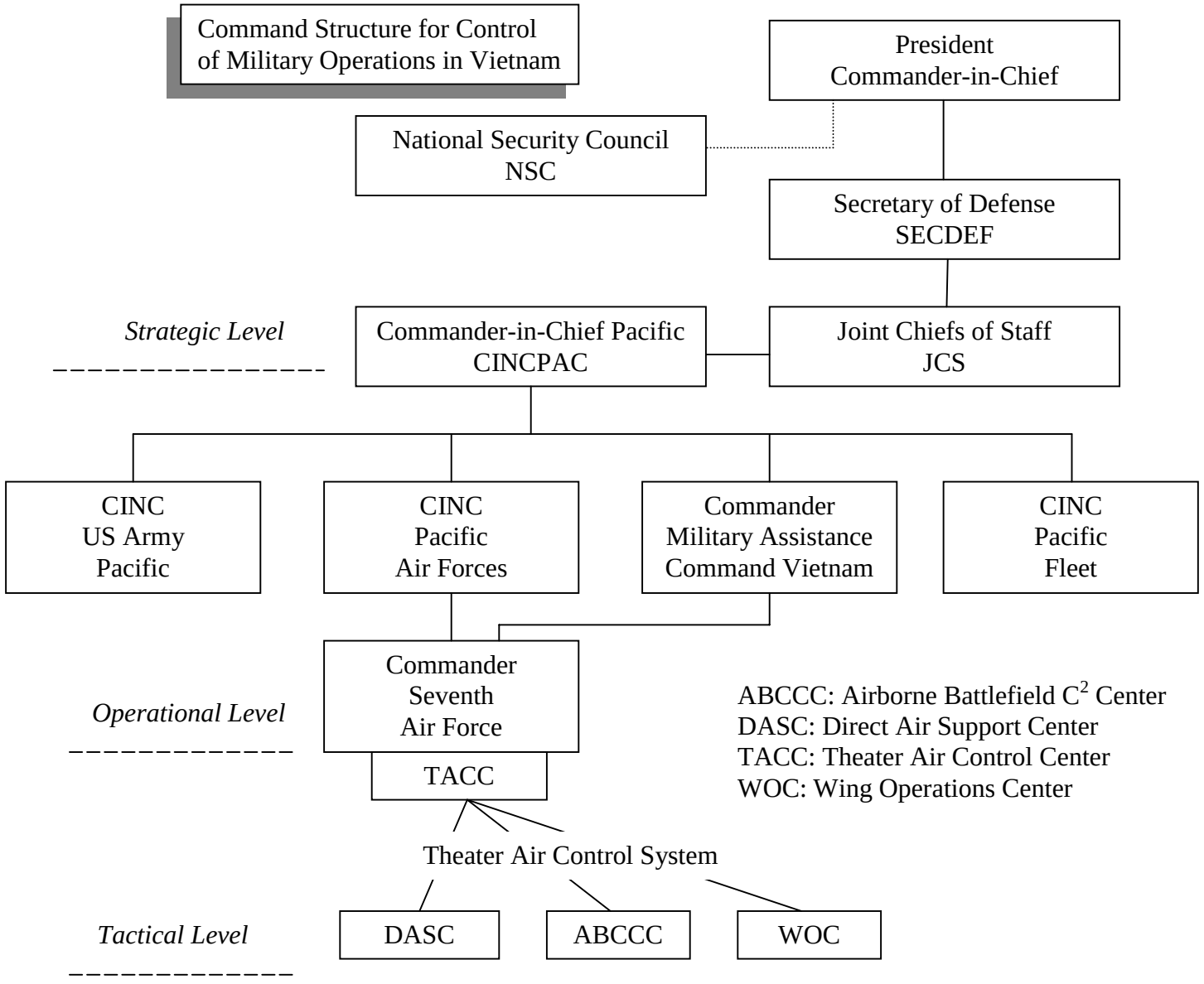

Figure 10. Command Structure for Control of Military Operations in Vietnam.

relationships during the bulk of the war.[101] It is important to note a few points about these command relationships. First, is that the military command structure was

[101] Strategic and Operational levels of command structure take from, U.S.G. Sharp, *Strategy for Defeat: Vietnam in Retrospect* (Navato, Calif.: Presidio Press, 1978), 38. Tactical level derived from A.W. Thompson and C. William Thorndale, "Air Response to the TET Offensive 30 Jan-29 Feb 68," (HQ

dysfunctional. Although the Seventh Air Force Commander (7 AF/CC), acting as the Deputy Commander for Air Operations, Military Assistance Command Vietnam, was supposedly the single manager for air in the theater, he did not control all airpower assets.[102] Navy and Marine airpower were controlled by their respective services, although the 7 AF/CC had limited control of Marine Corps assets following the 1968 TET Offensive. B-52s were controlled by the Strategic Air Command in the United States, although the Commander, United States Military Assistance Command Vietnam (COMUSMACV) had operational control over the heavy bombers for targets within the Republic of Vietnam.[103] Seventh Air Force commander controlled all USAF assets in SVN and exercised authority through the Theater Air Control System (TACS). TACS communications between the operational and tactical levels were adequate, even during the early portions of American involvement.[104] While the lower-level flow of information was effective, the mulitplicity of command structures at the operational level may have inhibited effective communication. The impression that communication from strategic-leaders to operational commanders was a one-way flow suggests that although communication channels were effective, the strategic level decision-makers usurped the command authority of operational leaders. The bottom line was that "command arrangements [were] a mess. The only one in charge was the President."[105]

Command Atmosphere

Information technology had a profound influence upon operations in Vietnam. Even as early as the Kennedy administration was this influence prevalent:

> The desire to control military operations more closely at the civilian level in the OSD [Office of the Secretary of Defense] and in the White House coincided with advances in communication technology that made possible the detailed monitoring of military activities in faraway theaters.[106]

PACAF: Project CHECO for Southeast Asia Report, 12 August 1968), following page 2. AFHRA K717.0413-32.

[102] Warren A. Trest, "Single Manager for Air in South Vietnam," (HQ PACAF: Project CHECO for Southeast Asia Report, 1 Jul 68): 1. AFHRA K717.0413-39.

[103] Warren A. Trest, "Control of Airstrikes in Southeast Asia, 1961-1966," (HQ PACAF: Project CHECO for Southeast Asia Report, 1 March 1967): 84. AFHRA K717.0414-4.

[104] General Paul D. Harkins, Letter to Amb Nolting, 23 April 1963. AFHRA K717.0413-30 Pt 5.

[105] Mark Clodfelter, *The Limits of Airpower* (New York: Free Press, 1989), 128-29.

Military commanders saw the potential danger in the capability of strategic leaders to control tactical events. General Westmoreland warned General Wheeler, the Army Chief of Staff:

> [Past] experience indicated that the more remote the authority which directs how a mission is to be accomplished, the more we are vulnerable to mishaps resulting from such things as incomplete briefings and preparation, loss of tactical flexibility and lack of tactical coordination.[107]

History has not been kind to President Johnson, who is often portrayed as one who micromanaged tactical details.[108] The command environment apparent under him indicates he was willing to intercede and run the war according to his personal prerogatives. He is quoted as saying, "…as long as I am the Commander-in-Chief, I am going to control from Washington."[109] Consequently, political overtones could be felt at every stage of employment.[110] President Johnson was able to control tactical operations by personally selecting and approving bombing targets at his famous Tuesday luncheons. Details from these meetings often got into employment tactics through the selection of weapons and attack profiles.[111] There was even anecdotal evidence that President Johnson not only picked targets but:

> …we hear that during the conflict in Southeast Asia, President Johnson personally chose targets to be struck in North Vietnam, or that one time he even called a jet fighter pilot in mid-air to give him instructions.[112]

These comments, although never substantiated, were accepted uncritically by those who wanted to believe and, nevertheless, helped establish the command environment under the Johnson administration. The president's personality indicates a strong likelihood that, given a compelling reason, he would directly interfere with tactical operations.

As for the command concept, this was also set by the strategic decision-makers, most notably, President Johnson and Secretary of Defense McNamara. President Johnson, as

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[106] H.R. McMaster, *Dereliction of Duty* (New York: Harper Collins, 1997), 31.
[107] McMaster, *Dereliction of Duty*, 233.
[108] Benjamin S. Lambeth, Steady Climb: The Transformation of American Airpower Since Vietnam (Arlington, Va.: IRIS Corporation, forthcoming), 27.
[109] McMaster, *Dereliction of Duty*, 266.
[110] Van Creveld, *Command in War*, 233.
[111] Clodfelter, *The Limits of Airpower*, 85.
[112] John Schlight, Civilian Control of the Military in Southeast Asia," *Air University Review* 32, no. 1 (November-December 1980): 57.

has been previously noted, was willing to exercise his prerogative as the elected Commander-in-Chief to take an active role in military affairs. Added to this, the Johnson administration appears to have been very sensitive to public and world opinion concerning US military actions in Vietnam.[113] These two factors provided the President and key advisors with a strong incentive to become intimately involved in tactical events. As a result, President Johnson exercised direct control by imposing strict Rules of Engagement (ROE) on military operations and by personally selecting targets, to include employment tactics, at his Tuesday White House luncheons.[114] Mark Clodfelter also indicates that President Johnson was able to exert indirect control over operations in Vietnam by enunciating strict policy guidance, allowing the strained relationship between the Secretary of Defense and JCS continue, and by focusing his attention on a domestic agenda at the expense of military operations.[115]

These White House strategy and tactics sessions took place in the marked absence of military input. Not even the Chairman of the Joint Chiefs of Staff, the President's primary advisor, contributed to decision-making. Senior military officers were not involved in the process until late 1967. According to Admiral U.S.G. Sharp, Commander-in Chief, Pacific Command;

> This omission, whether by deliberate intent or with the indifferent acquiescence of Secretary McNamara, was in my view a grave and flagrant example of his persistent refusal to accept the civilian-military partnership in the conduct of our military operations. [116]

Admiral Sharp's comment suggests a general disdain for political superiors, which can be expected to have a demoralizing effect on military commanders. Consequently, pilots in Vietnam, the tactical commanders, soon came to realize that the war was not being fought in the most effective manner. Some pilots who flew combat missions in Vietnam felt that, "an aura of arrogance and superiority emanated from the Secretary of Defense and that, added to the unwillingness of the Joint Chiefs of Staff to confront McNamara led to the erosion of respect and discipline at the operational and tactical level."[117] Since

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[113] Sharp, *Strategy for Defeat*, 128.
[114] Clodfelter, *The Limits of Airpower*, 85; Ibid., 118-19; Sharp, *Strategy for Defeat*, 86-87.
[115] Clodfelter, *The Limits of Airpower*, 122-25.
[116] Sharp, *Strategy for Defeat*, 86-87.
[117] Tom Clancy and Chuck Horner, *Every Man a Tiger* (New York: GP Putnam's Sons, 1999), 85-87.

airpower was apparently being used for and controlled by civilian purposes and often at the expense of military effectiveness, the command concept was poorly understood.[118] Furthermore, a poor operational and tactical command-and-control structure complicated the employment of airpower.[119] Poor discipline, flagging respect for both operational and strategic commanders, along with a poor command concept, appear to have been key factors limiting the flow of information from the operational and tactical levels to the strategic level. Additionally, Johnson's desire to discourage dissent stifled the flow of information up the chain of command. He wanted the Joint Chiefs of Staff to prevent criticism from the field from reaching the media and the American public.[120]

Technological Baseline

The US National Command Authorities had a system in place that provided a global command capability. The Worldwide Military Command-and-control System (WWMCCS) was a response to the advent of nuclear ballistic missiles and represented a major step toward the centralization of American command-and-control.[121] While this technical capability was available during the Vietnam War, it was not intended for use in conventional conflicts; and the response speed, despite the need for real-time command-and-control, was very inefficient. The 1968 Pueblo incident, in which North Korea seized a US Navy ship, is a case in point. According to I.B. Holley,

> The situation called for the utmost speed in communicating the details of the crisis to a command center where a decision could be made to launch an air strike in time to rescue the threatened vessel. But the system was far too slow for this. It was capable of supplying literally reams of data, but not in timely fashion. It [WWMCCS] had not yet reached the point where it could operate in the on-line, interactive mode required for an effective command-and-control system.[122]

The limitations of WWMCCS were not only technical, but procedural as well. WWMCCS was not intended or deployed to support tactical commanders. The C2 system was built to assist unified and specified commands only as a secondary role. The

[118] Schlight, "Civilian Control in SEA," 62.
[119] Clodfelter, *The Limits of Airpower*, 164-65.
[120] McMaster, *Dereliction of Duty*, 266.
[121] Holley, "Command, Control and Technology," 272.
[122] Holley, "Command, Control and Technology," 274.

secondary role was available only if tasking did not interfere with the primary mission of supporting the US National Command Authority.[123] Only now, as GCCS replaces WWMCCS, is the tactical level finally becoming connected to the strategic level.[124] The technological baseline for Vietnam was therefore limited in the ability to command tactical units from the strategic levels in real-time.

FLAMING DART

One of the earliest examples of airpower employment in Vietnam was Operation FLAMING DART. While not of great militarily significance, it represents a microcosm of the command environment during the conflict and sets the stage for examining subsequent operations. FLAMING DART was the name given to two operations conducted in February 1965 in reprisal for Viet Cong attacks on the air base at Pleiku and the Qui Nhon barracks. FLAMING DART I took place on 7 February 1965, followed three days later by FLAMING DART II. Operation FLAMING DART was a measured political response to enemy aggression. Consequently, these reprisals were tightly controlled from Washington with military commanders given no operational latitude to conduct tactical operations.[125] The Joint Chiefs were provided the politically appropriate response and were then responsible for directing the operational commanders—CINCPAC and in turn COMUSMACV—to execute the orders. [126] .

ROLLING THUNDER

ROLLING THUNDER was the name of the three and a half-year bombing campaign that took place from 2 March 1965 to 31 October 1968. It is often viewed as a prime example of coercive diplomacy through airpower. The National Command Authority tried to use bombing in graduated measures to force policy changes on the North

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[123] Harold E. Saxton, "The Use of WWMCCS by the Tactical Commander," (Naval War College Paper, Newport, R.I.: 1982), 4.
[124] JP 6-0, *C4 Systems Support*, II-11.
[125] Sharp, *Strategy for Defeat*, 56-59.
[126] Southeast Asia Team, "Rolling Thunder Mar-Jan 65," (HQ PACAF: Project CHECO for Southeast Asia Report, 28 March 1966): 5-9; Message, 070056Z FEB 65, CINCPAC to CINCPACFLT, subject: FLAMING DART Operation Order, 7 February 1965; Message, 110041Z FEB 65, CINCPAC to CINPACFLT, subject: FLAMING DART II Operation Order, 11 February 1965. AFHRA K712.1623-2.

Vietnamese government. In particular, the objective of Rolling Thunder was to undermine North Vietnamese support of the insurgency in the South.[127]

As with FLAMING DART, ROLLING THUNDER was characterized by political restrictions on tactical operations. Political control during ROLLING THUNDER took the form of armament limitations, strategic leaders personally selecting the targets, and even the dictation of tactics.[128] These restrictions waxed and waned throughout ROLLING THUNDER and were a major source of irritation to operational and tactical commanders.[129] Furthermore, Washington closely controlled the conduct of the campaign. The start of ROLLING THUNDER was delayed from 20 February until 2 March for political reasons and because Washington expressed concerns over weather in the theater.[130] Also, because the intent of ROLLING THUNDER was coercion, strategic leaders tailored execution to further political purposes. There were eight strategic pauses directed by Washington during the campaign. One of these, to provide an opportunity for the North Vietnamese to negotiate, lasted 37 days.[131]

Unlike FLAMING DART, ROLLING THUNDER provides examples of greater autonomy and increased interaction at the operational level. Where FLAMING DART was a reprisal campaign handed to the Joint Chiefs for implementation, Joint Staff planners initiated ROLLING THUNDER. In January of 1965, the Joint Chiefs of Staff recommended an eight-week bombing campaign against North Vietnam. The concept of operations behind ROLLING THUNDER was sent for approval to the Secretary of Defense and finally the President.[132] Additionally, although targets were submitted for approval at President Johnson's regular Tuesday luncheons,[133] the Joint Chiefs or CINCPAC always controlled ROLLING THUNDER target selection. Operational and tactical commanders could only exercise discretion by selecting targets that fit in narrow confines. They had authorization to engage certain pre-approved tactical targets, targets

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[127] Clodfelter, *The Limits of Airpower*, 39-72. Clodfelter provides one of the best accounts of Rolling Thunder. He does a particularly fine job describing the evolving goals and objectives of the campaign.
[128] Ibid., 118-19.
[129] Anonymous, "The USAF in Southeast Asia 1970-1973 Lessons Learned and Recommendations: A Compendium," (HQ PACAF: Project Corona Harvest, 16 June 1975): 64. AFHRA K717.0423-11.
[130] Southeast Asia Team, "Rolling Thunder Mar-Jun 65," 16.
[131] Schlight, *Civilian Control in SEA*, 60.
[132] Southeast Asia Team, "Rolling Thunder Mar-Jan 65," 14.
[133] Clodfelter, *The Limits of Airpower*, 85.

previously approved but required additional strikes, and Close Air Support targets[134] The measuring stick appeared to be that in-theater commanders had autonomy to act only if attacking targets that had little or no influence upon public opinion.

The command environment provides a possible explanation for some of the similarities between ROLLING THUNDER and FLAMING DART. The political nature of the war and the leadership style of strategic-level decision-makers necessitated restrictions on military operations. Examination of the message traffic found in the *Project CHECO Southeast Asia Report* supporting documents tends to indicate that restrictions, guidance, and changes traveled through the chain of command from the strategic, to the operational, and to the tactical level. Although the telephone and voice radio were undoubtedly important means of communication during the Vietnam War, the radio message system was the primary method for relaying information, particularly at the operational and strategic levels. Strategic and operational commanders used radio messages to discuss operational and tactical level details such as the status of air operations, air threat countermeasures, operational plans and force deployment details.[135]

The TET Offensive and Operation NIAGARA

On 30 January 1968 North Vietnamese and Viet Cong troops launched a massive offensive throughout South Vietnam. The air response to this offensive altered the parameters of Operation ROLLING THUNDER in several ways. First, because of the clear and present danger posed to South Vietnamese forces, the TET Offensive elicited a strong response from President Johnson. Additionally, in response to TET, the President lifted some of the political restrictions that were hindering Rolling Thunder operations.[136] Part of the enemy operation during TET was the siege of the United States Marine Corps firebase at Khe Sanh. The goal of Operation NIAGARA was to support the beleaguered Marines at Khe Sanh and deny the objective to the enemy.

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[134] Robert M. Burch, "Command-and-Control 1966-1968," (HQ PACAF: Project CHECO for Southeast Asia Report, 1 August 1969): 31. K717.0414-13.
[135] Message, 120314Z MAY 65, CINCPAC to JCS, subject: R OLLING THUNDER UPDATE, 12 May 1965; Message, 130049Z APR 65, JCS to CINCPAC, JCS 008940 subject: Air Threats, 13 April 1965; Message, 040304Z APR 65, CINCPAC to JCS, subject: Air Strike Continuation, 4 April 1965; Message, 210016Z MAR 65, CINCPAC to JCS, subject: Aircraft Deployment Schedule, 21 March 1965. AFHRA K712.1623-2.
[136] Clodfelter, *The Limits of Airpower*, 112-15.

Although military and political leaders were aware a major enemy offensive was planned for early 1968, the TET attacks caught American forces off guard. Since the operational situation was more reactive than other on-going operations, the operational-level commanders had more latitude conducting the air response to TET and Operation NIAGARA. There was little doubt that the operational-level military commanders were in charge of the response to TET.[137] Nowhere is this perhaps more apparent than in Operation NIAGARA. The President, recognizing the political value of maintaining control of Khe Sanh, demanded written assurances from the Joint Chiefs of Staff that the outpost would not fall into enemy hands. Such a request would suggest that the President, not the operational commander, was ultimately in charge of maintaining the viability of Khe Sanh. However, van Creveld implies that President Johnson understood the 'symbolic' and 'historic' value of the siege.[138] The written guarantee reflects both the personal disposition of the President to become involved and his desire to impart the importance of the objective to his military commanders. COMUSMACV subsequently drafted a message to all operational and tactical commanders in theater to take all necessary action to support the Presidential and Joint Chiefs guidance in support of Khe Sanh. The COMUSMACV message, titled "Continued Offensive", called on "every commander [to] launch a full offensive against the enemy."[139]

At the operational level, the Airborne Battlefield Command-and-control Center (ABCCC) was the focal point of operations. During NIAGARA, ABCCC augmented the capabilities of the Tactical Air Control Center (TACC) by exercising air command-and-control near Khe Sanh.[140] This command arrangement improved the flexibility of the Theater Air Control System (TACS) to handle real-time target changes, especially in Close Air Support (CAS) missions.[141] During TET and NIAGARA it appears that information was being transferred quickly in both directions between the operational and tactical levels.

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[137] General William W. Momyer, 7 AF/CC Memorandum for Record, subject: Notes of meeting with General Westmoreland, COMUSMACV, 5 February 1968. K717.0413-32 Vol. 2.
[138] Ibid., 257.
[139] Thompson and Thorndale, "Air Response to TET," 73.
[140] Memorandum for Record on Target Nominations, No Date. AFHRA K717.0413-35 Vol. 3.
[141] David E. Vincent, 1Lt USAF, Interview with CHECO Team, 29 February 1968. AFHRA K717.0413-32 Vol. 1.

The events leading up to TET also indicate that channels between the operational and tactical levels were functioning smoothly. On 22 January, more than a week before the TET offensive began, General Westmoreland detailed the threat to Khe Sanh and called for the defense of the outpost. A message was subsequently drafted with Operation NIAGARA being a military course of action to assist the defense of Khe Sanh.[142] This may have had an influence on the Joint Chiefs' recommendations and shaped President Johnson's commitment to defend Khe Sanh. Additionally, the day before the TET offensive began, General Westmoreland contacted the United States Ambassador and requested the President cancel the TET holiday truce in light of strong evidence an enemy attack was imminent.[143]

Correspondence between operational-level commanders suggests they were largely in control of military operations immediately following the TET Offensive. Tactical necessities during the response to TET and Operation NIAGARA may have forced strategic-level decision-makers to delegate authority to lower levels. Operational commanders in the combat zone had more latitude in target selection--tactical flexibility. Furthermore, despite the significance attached to Khe Sanh by presidential request, the operational commanders appeared to have been the key decision-makers during Operation NIAGARA.[144] Communications seem to have traveled by normal means in both directions of the chain of command.

LINEBACKER I

LINEBACKER was unlike any previous air campaign in Vietnam. The important difference for this study is the LINEBACKER took place in a different command atmosphere. A key plank in President Nixon's successful 1968 campaign platform was a

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[142] Message, (12584) 061047Z MAY 68, COMUSMACV to CDR 7 AF, subject: Continued Offensive, 6 May 1968. AFHRA K717.0413-35 Vol. 3.

[143] Warren A. Trest, "Khe Sanh-Operation NIAGARA, (HQ PACAF: Project CHECO for Southeast Asia Report, 13 September 1968): 22. AFHRA K717.0413-35.

[144] Gen William W. Momyer, 7 AF/CC, memorandum for record, subject: Meeting with Gen Westmoreland, 5 February 1968. AFHRA K717.0413-32 Vol. 2; Col H.H. Moreland, Chief, TACC Current Plans Division, memorandum for record, subject: Response to Khe Sanh/Camp Carrol Crisis, 20 February 1968. AFHRA K717.0413-35 Vol. 3; Gen William W. Momyer, 7 AF/CC, memorandum for Maj Gen Blood, subject: Air Response to Attach on Khe Sanh, 2 February 1968. AFHRA K717.0413-35 Vol. 3; Anonymous, memorandum for record, subject: Target Nominations (Operation NIAGARA), No Date. AFHRA K717.0413-35 Vol. 3.

pledge to reduce American involvement in Southeast Asia and ultimately achieve an "honorable withdrawal."[145] Unlike President Johnson, Nixon placed few restrictions on the application of air resources. In fact, as he reduced the number of ground forces in Vietnam, Nixon relied more heavily on airpower to accomplish political objectives.[146] Nixon provided policy guidance and let the military experts manage the specific details. No longer did pilots have to get targets approved in Washington. Operational commanders had "the prevailing authority to strike almost any target of military value."[147] Against the backdrop of this leadership style, it was unlikely that the strategic leaders would be disposed to interfere in tactical details.

LINEBACKER I was an air campaign with a limited political but a substantial military objective. Politically, President Nixon sought an American withdrawal that would not "abandon the South to an imminent Communist takeover."[148] The military objective was to stop the invasion of North Vietnamese conventional forces during their 1972 Easter Offensive. Airpower provided the means to this end. Once enemy intentions to mount this offensive became clear, the President, National Security Council, and the Joint Chiefs of Staff prepared for an all-out effort to stop North Vietnam.[149]

LINEBACKER was a result of a direct policy shift from the Johnson administration, and President Nixon wanted to prosecute a 'hard war' against North Vietnam. Nixon would not use the gradual application of force to accomplish the air campaign objective. The operation began with an 'execute order' from the Joint Chiefs of Staff on 9 May 1972.[150] The Rules of Engagement for LINEBACKER were much less restrictive than those for Rolling Thunder. Operational and tactical commanders were not only relieved of the crippling restrictions of Rolling Thunder, they had more tactical flexibility. Free from strategic micromanagement, they could make command decisions on such tactical considerations as target-area weather.[151]

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[145] Clodfelter, *The Limits of Airpower*, 147.
[146] Ibid.,, 149.
[147] Ibid., 164.
[148] Ibid.,148.
[149] M.F. Porter, "LINEBACKER: Overview of the First 120 Days," (HQ PACAF: Project CHECO for Southeast Asia Report, 27 September 1973): 14-15. AFHRA K717.0414-42.
[150] Calvin R. Johnson, "LINEBACKER Operations Sep-Dec 72," (HQ PACAF: Project CHECO for Southeast Asia Report, 31 December 1978): 3-5. AFHRA K717.043-102.
[151] Porter, "LINEBACKER: Overview of the First 120 Days," 49-51.

That is not to say strategic leaders gave operational commanders a *carte blanche* to run the war. There is at least one case in which strategic leaders gave short-notice tasking. This example occurred when a LINEBACKER mission was planned to strike four targets in the Hanoi area. A few hours before the mission, a message from Washington arrived at the TACC stating that two of the targets were to be deleted. Operational commanders had a certain degree of latitude to make the targeting decision, thereby sparing the Hanoi power plant and railroad yards.[152] Two important points can be made from this example. First, the strategic guidance to tactical planners was routed through operational-level channels. Second, the target changes were transmitted using standard military message channels. Therefore, it appears that strategic-level decision-makers, although interested in tactical affairs, did not skip echelons. Furthermore, this seems to be the normal mode of communication during LINEBACKER I. The *CHECO Report* summarizing LINEBACKER operations states restrictions to air activity during the campaign were transmitted via normal channels in message form. Normal channels were from the President, to the Secretary of Defense, to the Joint Chiefs, to CINCPAC and on to the operational-level commanders in Vietnam[153]

Observations

Information technology facilitated communication between the operational and tactical levels. Improved communication allowed for better air support of ground troops. The TACS was sufficiently responsive to requests from the Army, particularly requests for Close Air Support.[154] Another link between the operational and tactical level was the fragmentation order, or 'frag.' Although not a new concept, during Vietnam the 'frag' became more automated than in previous conflicts. The 'frag' was the standard link between 7 AF planners, the operational battlefield directors in the TACC and ABCCC and the field units.[155] Changes to the 'frag' were then transmitted by message, by

[152] John W. Vogt Jr., General USAF, Interview with CHECO Team, 12 November 1972. AFHRA K717.0413-102.
[153] Johnson, "LINEBACKER Operations Sep-Dec 72," 7.
[154] Warren A. Trest, "Control of Airstrikes in Southeast Asia 1961-1966," (HQ PACAF: Project CHECO for Southeast Asia, 1 March 1967): 37-38. AFHRA K717.0414-4.
[155] Melvin F. Porter, "Control of Airstrikes Jan 67-Dec 68," (HQ PACAF: Project CHECO for Southeast Asia Report, 30 June 1969): 5. AFHRA K717.0414-4.

telephone, or by radio once aircraft were airborne. Although this is an excellent example of real-time communication, the TACC did not possess a real-time command-and-control capability. Part of the airpower command-and-control problem was certainly the dysfunctional command arrangement that was fractured along service and major command lines at the operational level, but there were also technical limitations to real-time command-and-control.[156] COMBAT LIGHTNING was initiated to overcome these technical limitations by attempting to provide aircrews with real-time information about North Vietnamese air threats. COMBAT LIGHTNING consisted of a ground-based early-warning radar-and-communication system that was designed to build an accurate air picture for dissemination throughout the TACS. Unfortunately, the system failed to live up to its designed promise, and the attempt to provide real-time operational command-and-control at the operational level did not meet expectations.[157] From this it would appear a comprehensive real-time command-and-control system was beyond the technological capabilities of the day.

Communication from strategic leaders to operational commanders appears to have taken place without much difficulty. Although there were frequent meetings between leaders at the two levels, the bulk of communication seems to have taken place through messages. FLAMING DART reprisals and the execution orders for Rolling Thunder or LINEBACKER support this point. These operations were carried out after messages were sent from higher headquarters. This makes sense in light of the command environment. Strategic leaders wanted to exercise authority and did so.

The only glaring interface problem between the operational and strategic level seems to be communication up the chain. Van Creveld asserts that the military reporting system in Vietnam was inadequate. It was not suited to handle the demands placed on it, and normal military channels were flooded with inaccurate or irrelevant information that could not be processed in time to satisfy senior leaders. Perhaps the convoluted chain of command or a poor command concept constrained communication to higher headquarters. Pilots disillusioned with the conduct of the war most likely felt there was little point in reporting reality, they only wanted to serve their tours and rotate home.

[156] Anonymous, "The USAF in SEA 1970-1973," 116.
[157] Burch, "Command-and-control 1966-1968," 32-35.

Consequently, the media, in particular television, played an enormous role in reporting tactical events.[158] Television coverage of the TET Offensive illustrates this point. Another factor contributing to the poor flow of information up the chain of command could have been the willingness of the Commander-in-Chief to tolerate dissent. As mentioned earlier, President Johnson wanted the Joints Chiefs of Staff to prevent any criticism from the field from reaching the media and the American public.[159] The parable of the Emperor's new clothes is a suitable analogy for the reluctance of subordinates to report unfavorable information.

While detailed communications at the strategic-operational and operational-tactical interfaces can be identified, no evidence was found to support claims that strategic leaders were skipping-echelon and talking directly to tactical commanders. Once airborne, the only link tactical commanders had with operational or strategic leadership was through the TACC. Even during Operation NIAGARA, when the ABCCC performed TACC functions, the tactical combat platforms were limited to intra-theater communication.[160]

During the Vietnam War, the willingness of strategic leaders to interfere excessively with tactical affairs should not be confused with direct intervention or skip-echelon action. Strategic leaders had the capability to select targets and establish restrictive Rules of Engagement, so they did. Information technology made it possible for them to communicate their desires to the operational, and ultimately, to the tactical level commanders. Either limited capability to communicate directly with airborne aircraft or personal restraint could be possible reasons why there does not appear to have been examples of skipping-echelon during Vietnam. Even when facing the politically unsavory prospect of continued heavy B-52 losses during LINEBACKER II, there does not appear to be evidence that civilian leaders in Washington intervened directly. The Commander of Strategic Air Command (SAC) appears to have been the only strategic leader expressing concern over B-52 losses. CINCSAC's response to COMUSMACV

[158] Van Creveld, *Command in War*, 256.
[159] McMaster, *Dereliction of Duty*, 266.
[160] Robert M. Burch, "The ABCCC in Southeast Asia," (HQ PACAF: Project CHECO for Southeast Asia Report, 15 January 1969): 13. AFHRA K717.0413-39.

regarding B-52 appears in a message to CINCPACAF.[161] CINCSAC's message was then communicated from CINCPACAF, to CINCPAC, and finally to COMUSMACV in Saigon.[162] In the meantime, other agencies at SAC and PACAF were coordinating B-52 operations directly with 7 AF.[163] Neither CINCSAC nor the coordinating agencies appear to have overstepped their bounds. Communications were within the established chain of command or the information transmitted was advisory in nature and required for coordinating B-52 operations over Vietnam.

Technology, broadly applied to command-and-control, does not appear to have the impact leadership did. According to Dr. Kenneth P. Werrell, who was commenting on the force application aspects of airpower in Vietnam:

> Technology is important, but it is only one factor in fielding a capable and winning Air Force. What failed in Vietnam was not the technology, but a broad understanding of the power and limits of both air power and air technology.[164]

Almost certainly, the same can be said for the technology of command-and-control.

One area where information technology does seem to have resulted in skipping-echelon is communication from the tactical to the strategic level. The instantaneous television footage sent back to the United States gave strategic impact to tactical events. It also provides the prologue to the so-called "CNN effect."

Operation DESERT STORM

The 1991 Persian Gulf War was a stark contrast to the Vietnam War. The legacy of Vietnam had a powerful influence on many of the key decision-makers for conducting DESERT STORM. Perhaps the most significant lesson learned from Vietnam was to

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[161] Message, 222020Z DEC 72, CINCSAC to CINCPACAF, B-52 Operations, 22 December 1972. AFHRA K717.0413-102.
[162] Johnson, "Linebacker Operations Sep-Dec 72," 60-62.
[163] Message, 221935Z DEC 72, AFSSO PACAF to 7 AF, subject: B-52 Operation, 22 December 1972. AFHRA K717.1623; Message, 082030Z JAN 73, subject: LINEBACKER II ARC LIGHT Day Nine, 8 January 1973. AFHRA K717.0413-102.
[164] Kenneth P. Werrell, "Did Technology Fail in Vietnam? Three Case Studies," *Airpower Journal* 12, no. 1 (Spring 1998): 97.

eliminate excessive interference by civilian and senior military officials during the conduct of combat operations in the Gulf War.[165] As a result, "civilian decision-makers, no less than soldiers, had in mind a host of Vietnam-era lessons; in particular let the military design the campaign to support broad political guidance."[166] DESERT STORM was not to be a re-run of Vietnam, "where Pentagon warriors dictated tactics, techniques and procedures" to commanders in the field.[167]

Although Operation DESERT STORM provides a far shorter case study than Vietnam, it is still convenient to assess specific aspects of the operation to determine how information technology may have influenced airpower command-and-control. Focusing on a finite number of significant events allows for a more thorough evaluation than attempting to examine the entire operation. Therefore, this case study will examine four major events or considerations of the Gulf War. These events are the SCUD suppression operations, the concern for collateral damage, the battle of Al-Khafji, and preparation for the ground offensive.

Chain of Command

The command structure in effect during the Gulf War was in large part the result of the 1986 Goldwater-Nichols Defense Reorganization Act. In addition to streamlining the chain of command, Goldwater-Nichols gave theater CINCs more operational authority than they had previously and reduced the authority of the Joint Chiefs as a collective body. In essence, the Chairman became the chief military advisor to the President and Secretary of Defense, but no longer had authority to task the operational chain of command.[168] Figure 11 updates the command relationships at the various levels of war and shows the American force structure during DESERT STORM.[169] Like Vietnam, the theater CINC played a major role in the operational command chain.

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[165] Jeffrey Record, *Hollow Victory: A Contrary View of the Gulf War* (Washington, D.C.: Brassey's, 1993), 81.
[166] Thomas A. Keaney and Eliot A. Cohen, *Revolution in Warfare? Air Power in the Persian Gulf War* (Annapolis, Md.: Naval Institute Press, 1995), 184.
[167] Clancy, *Every Man a Tiger*, 475.
[168] James P. Coyne, *Airpower in the Gulf War (Arlington, Va.: Air Force Association, 1992)*, 154.
[169] Operational and strategic levels adapted from Coyne, *Airpower in the Gulf War*, 154. Source for the tactical level of Figure 11 is *GWAPS*, Vol. 1 Part 2 Command-and-control, 2.

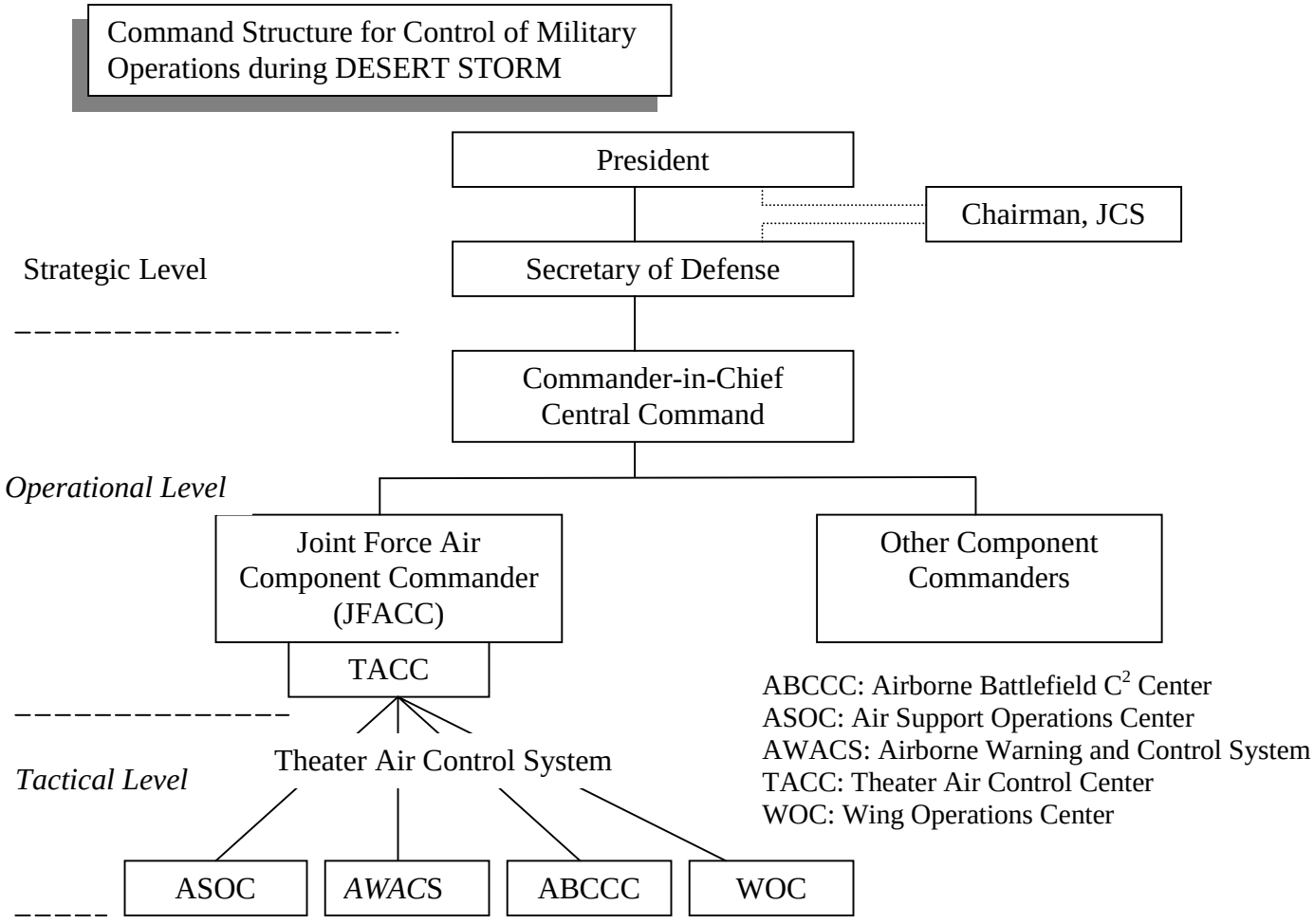

Figure 11. Command Structure for Control of Military Operations during DESERT STORM.

Unlike Vietnam, airpower in the Gulf War had a single point of command-and-control. In keeping with joint doctrine, General H. Norman Schwarzkopf established the single point of airpower command-and-control by designating Lieutenant General Charles A. Horner to be the Joint Force Air Component Commander (JFACC).[170] As a result, the operational level air commander, acting under the authority of the theater commander, had control of almost all air assets. The exceptions were Joint Task Force PROVEN FORCE, which operated out of Turkey, US Navy controlled fleet air defense sorties, and US Marine controlled direct support sorties. The JFACC was able to assert

[170] Headquarters, United States Air Force, JFACC Primer (Washington, D.C.: Deputy Chief of Staff, Plans and Operations, August 1992): 6.

procedural control of these assets by developing a dedicated engagement area for PROVEN FORCE in northern Iraq and by deconflicting airspace with the maritime assets.[171]

Command Atmosphere

The preamble to this case study says volumes about the command environment surrounding Operation DESERT STORM. From the beginning of the crisis, strategic level "civilian and military leaders declared the strong desire that the theater commander run the war."[172] Consequently, the major strategic decisions were made in Washington in October 1990, and the operational-level commanders were left to run the war with only periodic policy adjustments.[173] This command environment was a result of President George Bush's personal leadership style. He issued broad strategic guidance and established clear parameters, but did not become involved in operational decisions unless they were directly related to his strategic design. There was no attempt by the White House to run the war, interfere in daily events or meddle with theater commander's duties.[174] This was not only true of the White House, but also with the senior leaders at the Pentagon. "Washington headquarters did not micromanage the Gulf War; targeting suggestions were sent to the theater, but theater commanders ran the war."[175] Perhaps the comments made by General Schwarzkopf, the theater commander-in-chief (CINC), best describe the command environment. After a 25 February 1991 telephone call with President Bush, their first conversation in nearly two months, Schwarzkopf notes:

> As I hung up the phone, I was struck by what the President had chosen not to say: he had given me no orders and had not second-guessed the decisions I had made, and the detailed questions he had asked had been purely for clarification.[176]

A similar command environment is apparent at the operational level. Operational commanders restrained themselves from interfering with the tasks of

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[171] Keaney and Cohen, *Revolution in Warfare?* 136-37.
[172] Ibid., 210.
[173] Charles A. Horner, Lieutenant General USAF, Interview by Barry Jamison, Rich Davis and Barry Barlow, Shaw AFB SC, 4 March 1992. AFHRA K239.0472-94.
[174] Record, *Hollow Victory*, 119.
[175] Keaney and Cohen, *Revolution in Warfare?*, 185.

subordinates. In the words of General Horner, "[I] was on the point of giving commands [telling tactical operators what to do] and then stopped. I needed to have faith and trust in subordinates. They knew how to do the job."[177] It is logical to assume, given such a climate, that tactical air commanders would also have sufficient latitude to accomplish the mission.

The relatively free hand operational commanders had to conduct the war permitted them to develop and articulate a command concept to meet strategic objectives. The CINC, remembering the employment of airpower in Vietnam, delegated the air war to his JFACC. Schwarzkopf thought strongly that the air effort must be planned and executed in theater. [178] The CINC's command concept, or vision of air operations, was transmitted to tactical commanders in the daily Air Tasking Order, or ATO.[179] It was the responsibility of the JFACC to develop the ATO for the CINC, and General Horner used this forum to transform strategic guidance into operational objectives and tactical tasks.[180]

In examining the command concept, Builder states that heavy communications traffic flow up the chain indicates a failure. However, such an observation is both relative and subjective. It is difficult to quantify heavy communications traffic flow; and a situation that may be characterized as heavy in one case, may be normal in another. Therefore, to put the DESERT STORM communication traffic flow in context, it is necessary to rely on a subjective assessment. Using Operation DESERT STORM as one of his case studies, Builder notes the minimal level of communication between Riyadh and tactical commanders. He asserts that subordinate commanders in DESERT STORM had a good idea of what higher-level leaders expected.[181] As a counter to this, however, it is easy to track a significant number of changes during ATO implementation. In fact, nearly twenty percent of all airpower missions were changed between ATO publication and aircraft takeoff. Many more changes were sent after aircraft had taken off.[182] ATO changes were coordinated in near real-time through fax, telephone, radio, and data-link

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[176] H. Norman Schwarzkopf with Peter Petre, *It Doesn't Take a Hero* (New York: Bantam, 1992), 460.
[177] Clancy, *Every Man a Tiger*, 341-42.
[178] Clancy, *Every Man a Tiger*, 187.
[179] *Gulf War Air Power Survey Vol.1 Part 2 Command-and-control* (Washington, D.C.: Government Printing Office, 1993), 8-10.
[180] Keaney and Cohen, *Revolution in Warfare?*, 5. During the war translation of strategic guidance into the ATO can be extracted from, "CENTAF TACC/CC/DO Current Operations Log". AFHRA TF4-12-227.
[181] Builder, *Command Concepts*, 69.

communications. While the volume of changes might indicate a breakdown in the command concept, the opposite is true. ATO changes, for the most part, were attempts by the TACC Duty Officer to increase the effectiveness of the ATO or respond to short-notice tasking as the war unfolded.[183] In this case, the TACC Duty Officers appear to have understood the JFACC vision, taken advantage of the robust communication system, and sought to refine the JFACC concept by responding to changes in a dynamic battlespace.

Technological Baseline

American communications capabilities had improved greatly since Vietnam. While the technology of 1991 was superior to that of two decades earlier, the DESERT STORM communication story is also one of "ingenuity, innovation, and improvisation."[184] CENTCOM planners did not have an adequate communication system in place to support an effort the size of DESERT SHIELD and DESERT STORM. The in-theater communication suite available shortly after the Iraqi invasion of Kuwait included ultra-high frequency (UHF) and super-high frequency (SHF) satellite communications, some high frequency (HF) radio capability, secure voice and facsimile resources as well as limited access to the Defense Switched Network, the Automatic Digital Network (ADN) for messages, and WWMCCS.[185]

The United States took advantage of the Iraqi decision not to expand its ground offensive into Saudi Arabia to build a robust communication system. Military and commercial communication satellites made the transition from a fragile infrastructure to a mature capability. At the peak of DESERT STORM operations, the communications system was capable of daily handling approximately 700,000 telephone calls, more than 152,000 messages, and managing 30,000 radio frequencies.[186] The high volume of telephone traffic and the ubiquity of telephone connections suggests it was the most routine mode of both inter-theater and intra-theater communication.

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[182] Cohen, "The Mystique Airpower," 113.
[183] Clancy, *Every Man a Tiger,* 316; Ibid., 370.
[184] Alan D. Campen, "Introduction," In *The First Information War* (Fairfax, Va.: AFCEA International Press, 1992), xii.
[185] Larry K. Wentz, "Communications Support for the High Technology Battlefield," in *The First Information War,* ed. Alan D. Campen (Fairfax, Va.: AFCEA International Press, 1992), 8.
[186] Joseph S. Toma, Desert Storm Communications," in *The First Information War,* ed. Alan D. Campen (Fairfax, Va.: AFCEA International Press, 1992), 1-2.

In addition to the importance of satellite and land based telephone communications, the USAF deployed the Computer Assisted Force Management System (CAFMS) to control air assets. CAFMS uses a dedicated voice and data circuit to link remote sites.[187] Consequently, the TACC at Riyadh had a direct link to the Wing Operations Center (WOC) at each deployed land-based location. Carrier-based assets, lacking CAFMS terminals, were dependent upon air couriers who delivered the ATO to the ships daily. Regardless of this limitation, CAFMS provided the backbone of the command-and-control system between the JFACC and the tactical units. The radio communications network used by the TACC to conduct the war supplemented CAFMS.

Anti-SCUD Operations

Shortly after the commencement of the air attack portion of DESERT STORM, Saddam Hussein began launching surface-to-surface SCUD missiles. Although the military threat of these missiles was low, the political impact was great. Iraqi missiles were targeted at civilian population centers in Israel. The apparent political motivation of these attacks was to evoke an Israeli military response that would endanger the cohesion of the anti-Iraqi coalition. Early ATO targets included the known, fixed SCUD sites in Iraq. However, the mission of finding, targeting, and destroying mobile sites was much more problematic. It took a great deal of effort to accomplish an objective with little military value. General Horner, thinking damage from SCUD missiles was militarily insignificant, opposed diverting air resources from other targets whose destruction he thought offered greater contribution to the war effort. Chairman of the Joint Chiefs of Staff, General Colin Powell recognized the significance of the SCUD threat in political terms and insisted that considerable resources be devoted to the pursuit of their launchers.[188]

Despite claims that operational commanders had a free hand in conducting operations, the diversion of resources to hunt SCUD missiles suggests there was political influence on military operations during the war.[189] Operational commanders quickly followed their superiors' directives and translated the guidance into tactical employment

[187] John Paul Hyde, Johann W. Pfeiffer and Toby C. Logan, "CAFMS Goes to War," *in The First Information War,* ed. Alan D. Campen (Fairfax, Va.: AFCEA International Press, 1992), 39-41.
[188] Clancy, *Every Man a Tiger,* 378-86.
[189] Cohen, "The Meaning of Air Power," 198.

schemes.[190] In this case, Chairman Powell's detailed and explicit guidance to General Schwarzkopf was clearly justified. Coalition cohesion was the Achilles heel of the American-led effort against Iraq. Saudi basing rights were merely the most demonstrable evidence of US reliance on Arab good will. Precipitous action by Israel in response to Iraqi SCUD attacks could have significantly jeopardized Arab support for the war. Therefore, the SCUDS had to be suppressed sufficiently for the Israelis not to take unilateral action, even if this mean meant postponing the attack of operationally significant targets. Thus, Powell's actions should be considered as legitimate strategic oversight rather than unwarranted meddling in operational details.

Collateral Damage and the Al-Firdos Bunker

Collateral damage was frequently a major consideration during DESERT STORM. Attempts to reduce collateral damage are quite often the primary planning factor. Pentagon public affairs briefings and press releases tend to confirm this. The Gulf War was a particularly notable instance of efforts taken to reduce collateral damage and limit civilian suffering. However, on the night of 13 February 1991, USAF strike aircraft attacked the Al-Firdos bunker, which was also being used at a civilian bomb shelter. Negative publicity after the attack prompted strategic leaders in Washington to respond by limiting attacks in Baghdad.[191] According to Wayne Thompson,

> In the wake of Al-Firdos, [Lieutenant General] Horner was no longer free to send even his F-117 precision strike force into Baghdad without approval from higher authority. Horner was under the impression that Schwarzkopf began to check all such targets with Powell.[192]

It is important to point out that it was the senior military leadership, in particular General Powell who curtailed bombing in Baghdad, although this may have been "a preemptive political control that was exercised on behalf of the politicians."[193] As with anti-SCUD operations, General Powell realized the significance of collateral damage. Adverse public opinion generated in the response to additional instances of collateral damage could have substantial negative impact on coalition and domestic support. Similarly, the

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[190] Lambeth, *Steady Climb*, 119.
[191] Richard P. Hallion, *Storm over Iraq: Airpower and the Gulf War* (Washington, D.C.: Smithsonian Institute Press, 1992), 199.
[192] Wayne W. Thompson, "After Al-Firdos: The Last Two Weeks of Strategic Bombing in DESERT STORM," *Air Power History* (Summer 1996): 52.

guidance restricting targets in Baghdad should be considered legitimate oversight rather than excessive interference.

Battle of Al-Khafji

Al-Khafji is a small Saudi village on the Arabian Gulf coast just south of the Kuwaiti border. Because defensive positions near Al-Khafji were within Iraqi artillery range, coalition forces withdrew to a more tenable location. During the night of 29-30 January, twelve days into DESERT STORM, the Iraqis launched several small battalion-sized attacks into Saudi Arabia and captured the undefended, evacuated border town. The reasons for the Iraqi offensive against Al-Khafji are not completely understood. Some analysts argue it was a deliberate ploy by Saddam to bait a coalition counterattack that would produce heavy American casualties. Others indicate it was an advance on the pan-Arab forces with the intent of dissolving coalition unity. Iraqi prisoners of war claimed the major objective was to capture American troops. [194] Although military experts disagree over exactly why the Iraqi army tried to take Al-Khafji, the coalition response routed the offensive. USAF Joint Surveillance and Target Radar System (JSTARS) aircraft spotted and tracked the massing Iraqi armor as it converged on Al-Khafji. As the threat developed, JSTARS was able to coordinate air attacks through the TACC in Riyadh.[195] The JFACC did not have to seek approval from strategic leaders; he simply approved the plan and let the TACS respond to the dynamic battlefield situation. Horner was thus able to take advantage of a golden opportunity.[196]

The Battle of Al-Khafji does have a relevant sub-plot. The Saudi theater commander, a personal friend of the JFACC, Lieutenant General Khalid bin Sultan bin Abdul Aziz, was in the vicinity of Al-Khafji inspecting coalition troops as the Iraqi attack began. He immediately contacted General Horner by telephone at the TACC telephone and issued an impassioned plea for air support. Although General Khalid wanted the JFACC to intervene and personally dispatch air assets to Al-Khafji, Horner exercised restraint. He assured General Khalid that the normal TACS procedures would provide more than

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[193] Cohen, "The Meaning of Air Power," 198.
[194] U.S. Department of Defense, *Conduct of the Persian Gulf War* (Washington, D.C.: GPO, 1992), 130.
[195] Clancy, *Every Man a Tiger*, 421-33.
[196] Lambeth, *Steady Climb*, 107.

enough air support if he would just remain patient.[197] This event is relevant to command-and-control in two respects. First, it highlights the human attributes of the JFACC. Second, it implies he had the technological capability to direct airpower to the battle at Khafji immediately.

Ground War

As G-day, the date for the ground offensive, approached, airpower became increasingly responsible for destroying Saddam's fielded military forces. In addition to the A-10 and B-52 missions striking ground targets in the Kuwaiti Theater of Operations, F-111 and F-16 aircraft began to 'prepare the battlefield' for a ground assault. F-111s, using GBU-12, 500 pound LASER guided bombs (LGB) destroyed Iraqi armor in the desert using tactics referred to as 'tank plinking.'[198] Likewise, F-16 pilots became Killer Scouts, responsible for finding and directing attacks against mobile ground targets far away from the front line of friendly ground forces.[199] To handle urgent CAS requests that ground commanders anticipated during the initial stages of the ground offensive, General Horner instituted a system of push-CAS. Push-CAS entailed tasking specific aircraft to provide support to the army. At a given time, if the available assets are not needed for CAS, they can proceed to an attack on an alternate target. The only concern for the JFACC was to ensure adequate CAS aircraft were available to ground forces in need. Once the ground war began, General Horner only had to monitor air operations and watch the ground offensive advance. The TACC had the vision and flexibility to conduct his air operations without requiring his direct intervention.[200]

Observations

Analysis of the four events reveals several trends on the use of communication during DESERT STORM. Communication between the strategic and operational levels appears to be heavily influenced by the command environment. The fact that President Bush provided early guidance, making the significant decisions in October and subsequently did not talk to the theater CINC implies that there was no intent to micromanage or

[197] Horner interview.
[198] Lambeth, *Steady Climb*, 110.
[199] Clancy, *Every Man a Tiger*, 415-16.
[200] Horner interview.

control tactical level details. Added to this, General Powell, although not directly in the chain of command, made sure strategic communications were routed through him. He maintained a "near monopoly on communications with the theater commander," and virtually all information came through the Chairman's office.[201] Additionally, the JFACC was required to report to the Joint Staff frequently. He had to "feed the information-monster" every three to four hours.[202] This communication arrangement suggests there was a discrete and well-defined reciprocating channel between the strategic and operational levels. General Schwarzkopf saw the role of the CINC as a facilitator between the strategic and operational level. He worked closely with Secretary of Defense Cheney and General Powell throughout the war, particularly after the Al-Firdos bunker incident and as the ground operations were concluding.[203] The structure and function of the chain of command indicates effective communication between the strategic and operational levels. Operational commanders routinely informed strategic decision-makers of theater status. Strategic leaders appear to have provided guidance only when events warranted periodic updates.

Communications between the operational and tactical levels were more robust during DESERT STORM than Vietnam. There were more tactical command-and-control nodes available to give the JFACC the capability to intervene directly in tactical execution. The frequent occurrence of ATO changes in the TACC suggests that improved radio, telephone, and data link systems gave the JFACC a means to intervene. However, examination of the TACC Duty Officer log indicates that these changes were simply in response to the dynamic environment and represented efforts to optimize the ATO. [204] The JFACC exercised restraint; and, by allowing the tactical experts flexibility to prosecute the war, the TACC became an effective conduit for near real-time command-and-control.

Communication between the strategic and tactical levels appears almost nonexistent in DESERT STORM. That does not mean it did not occur, but that it was rare. One example, demonstrating that the capability did exist, occurred before the war and

[201] Cohen, "Meaning of Airpower," 198.
[202] *GWAPS* Vol.1 Part 2, 61
[203] Horner interview.

involved the United States Navy. During the blockade of Iraqi vessels in the Persian Gulf, a naval frigate, USS Reid fired warning shots across the bow of a merchant vessel that would not stop for boarding and search. The on-scene commander, acting on orders from the Joint Staff, sought permission to fire at and disable the vessel. The Joint Staff contact immediately revised the orders and directed the captain not to sink the ship without "go-ahead from the White House."[205] Technical means may also partially be responsible for the paucity of examples illustrating direct strategic involvement in the application of airpower. Although the capability of the operational-level commander to influence directly the tactical employment of airpower had improved, as of DESERT STORM there was "no single line of authority from the President to the cockpit."[206]

An additional example of direct communication between the tactical and strategic levels took place outside the military command structure; and, as in Vietnam, it occurred through the media. Journalists were able to report tactical events in real-time over commercial satellite channels.[207] This is germane to the command-and-control of airpower by virtue of the impact it had on control of the war. It was the media coverage of Al-Firdos that led to the Baghdad bombing restrictions. In fact, the media coverage was so efficient that General Horner learned about the Al-Firdos incident on CNN (Cable News Network) long before it was reported through intelligence channels.[208] Additionally, the anticipated reaction of the American public to CNN footage displaying the efficacy of airpower on the "Highway of Death" during the late stages of the ground offensive may be linked to the coalition's cease-fire.[209]

As for the influence of technology on the command-and-control of airpower during Operation DESERT STORM, it is safe to assert that while the capability for strategic leaders to interfere with tactical execution may have existed, there is no indication they did so. Technological improvements appear to have aided communications between the

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[204] "CENTAF TACC Liaison Officer Log," Vol. 1, 16-31 January 1991. AFHRA TF4-12-227; Vol. 2, 2 February-15 March 1991. AFHRA TF4-12-228.
[205] Schwarzkopf, *It Doesn't Take a Hero*, 321-22. Also see Michael R. Macedonia, "Information Technology in Desert Storm," *Military Review* 72, no. 10 (Oct 92): 35. Macedonia gives an account of the story that places General Powell on the telephone with General Schwarzkopf as the CINC is talking by radio directly to the USS Reid.
[206] *GWAPS*, Vol. 1 Part 2, 382.
[207] Campen, "Info, Truth and War," 87.
[208] Clancy, *Every Man a Tig*er, 389.
[209] Keaney and Cohen, *Revolution in Warfare?* 216.

strategic-operational and operational-tactical interfaces. To cite Dr. Eliot Cohen, director of the Gulf War Airpower Survey (GWAPS):

> [The Persian] Gulf War's abundance of reliable communication to, and within the theater of operations had dramatic impact. Communication technology subverted hierarchies and rendered abundant exchanges between the theater and the U.S. both inevitable and desirable.[210]

An example of this may be the relationship established between Brigadier General Buster Glosson, CENTAF Director of Combat Plans, and Rear Admiral Michael McConnell, the Joint Staff J-2 Deputy Director of the Defense Intelligence Agency. General Glosson was dissatified with in-theater intelligence support, so he developed an informal channel with RADM McConnell back in Washington. The operational commanders did not approve such activity, but it was tolerated because it got results.[211]

While these examples may suggest the capability for direct communication was possible, despite previously mentioned technical limitations, they do not support claims that such behavior occurred. At the strategic level, the Commander-in-Chief greatly influenced the command environment. His experience as a naval aviator in World War II no doubt shaped his actions. Moreover, it is reasonable to conclude that President Bush was accustomed to the idea of a commander's independence, and he was willing to let the officers in theater act, as they deemed prudent. Perhaps the best explanation as to why such interference did not occur can be found in the lessons of Vietnam.[212] At both the strategic and operational levels, where leaders were shaped by the Vietnam experience, restraint seems to be the common theme. General Horner stated he had the desire to interfere but did not act on it. Likewise, Air Force Chief of Staff General Merrill McPeak exercised restraint when communicating with Air Force leaders in the theater. Ultimately responsible for training and equipping USAF units, General McPeak appreciated the potential dangers of usurping the established chain of command. Communications from the Air Staff went through the Joint Chiefs and Central Command enroute to the theater.[213] Commanders at all levels appeared to follow the chain of command and let their subordinates conduct operations as they saw fit. Despite the capability, it seems

[210] Cohen, "Mystique of Airpower," 118.
[211] *GWAPS,* Vol. 1 Part2, 181-85.
[212] Macedonia, "Information Technology in Desert Storm," 39.

these leaders did not have the will to intervene. Strategic leaders trusted the operational commanders to get the job done and were not inclined to meddle.

Operation DELIBERATE FORCE

Operation DELIBERATE FORCE, which took place under the auspices of the United Nations (UN), was initiated after it was determined that the Bosnian Serb Army (BSA) was responsible for the 28 August 1995 mortar attack on a Sarajevo market, which killed 37 people. The air campaign commenced on 30 August when North Atlantic Treaty Organization (NATO) aircraft struck Bosnian Serb military targets and terminated with a cease fire on 14 September.[214] DELIBERATE FORCE was a coercive air attack plan designed to dissuade BSA military forces from threatening or attacking designated safe areas and UN peacekeeping forces. The mechanism of coercion was the threat of air attacks that would neutralize BSA military potential. NATO campaign objectives were clearly stated in resolutions that sought two conditions: first, to assure freedom of access to the cities in Bosnia-Herzegovina; and second, for BSA forces to remove heavy weapons from around Sarajevo.[215]

Chain of Command

The particular conditions of Operation DELIBERATE FORCE dictated two parallel chains of command, creating a situation that provided less than optimal political and military coordination and guidance.[216] This command arrangement was a necessary condition if NATO airpower were to be used in support of UN peacekeeping forces. Consequently, the NATO and UN command structures were tied together.[217] Figure 12 details the command structure of Operation DELIBERATE FORCE.[218]

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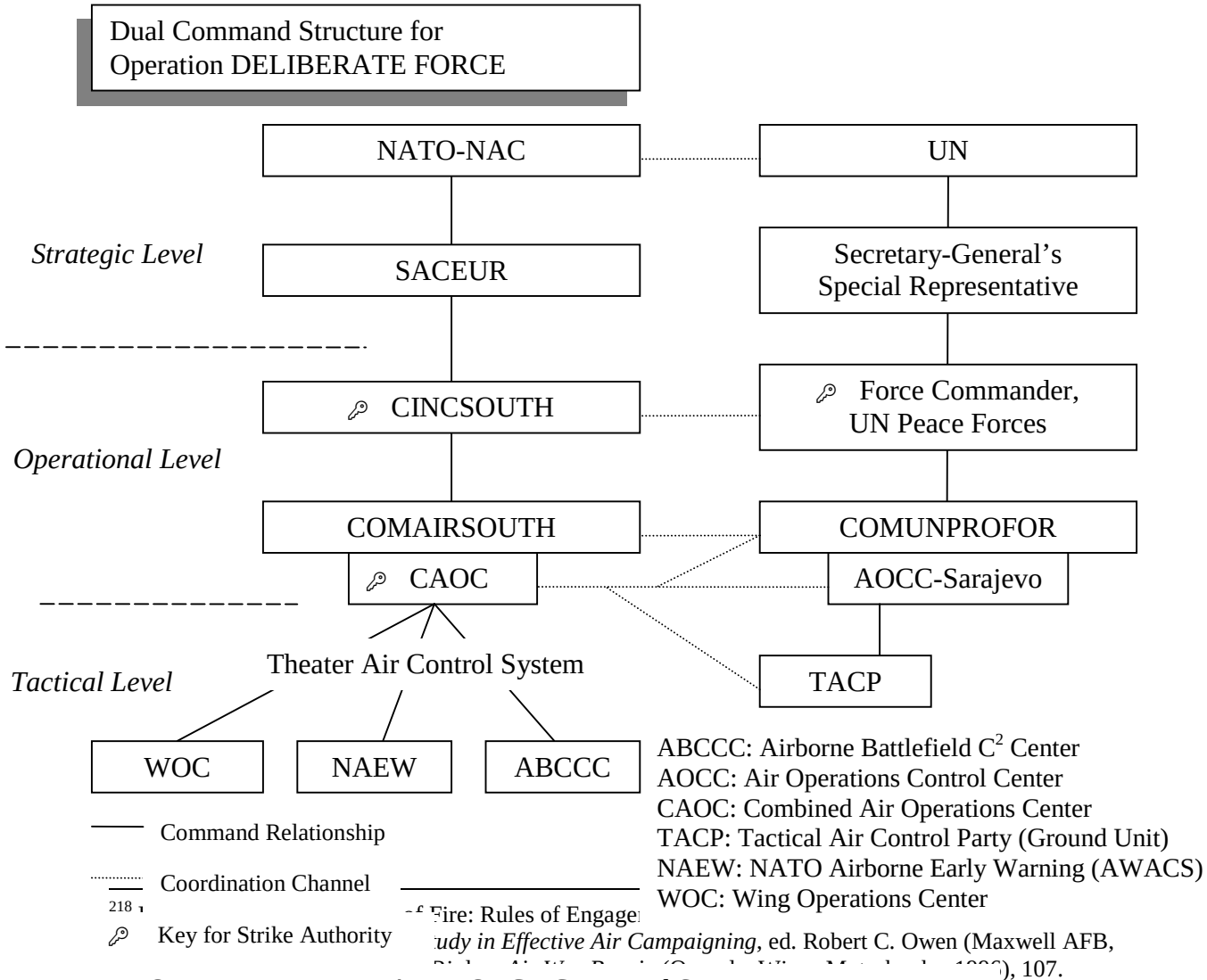
[213] Coyne, *Airpower in the Gulf*, 154.
[214] Robert R. Tidwell and David A Sawyer, "USAFE"s Response to the Balkan Crisis: A Brief History of Operations Provide Promise and DENY FLIGHT-August 1995, Vol. 1" (Vincenza, Italy: Combined Air Operations Center History Office, 13 October 1995), 15. AFHRA BACS B1b(2)-1 CAOC-24.
[215] Robert D. Pollock, "Roads Not Taken: Theoretical Approaches to Operation Deliberate Force," in *DELIBERATE FORCE: A Case Study in Effective Air Campaigning*, ed. Robert C. Owen (Maxwell AFB, Ala.: AU Press, 2000), 433.
[216] Bradley S. Davis, "The Planning Background," in *DELIBERATE FORCE: A Case Study in Effective Air Campaigning*, ed. Robert C. Owen (Maxwell AFB, Ala.: AU Press, 2000), 37.
[217] Mark J. Conversino, "Executing DELIBERATE FORCE, 30 August-14 September 1995," in *DELIBERATE FORCE: A Case Study in Effective Air Campaigning*, ed. Robert C. Owen (Maxwell AFB, Ala.: AU Press, 2000), 290.

An interesting feature of this parallel command structure was the "dual-key" requirement necessary for the authorization of air strikes prior to the start of Operation DELIBERATE FORCE. Under the "dual-key" arrangement, responsible commanders from both the UN and NATO chains of command had to authorize consent.[219] This command arrangement, while complicating NATO command-and-control of airpower, was necessary for "ground commanders to have control over air actions affecting the security of ground forces."[220]



218 ... of Fire: Rules of Engage...
...udy in Effective Air Campaigning*, ed. Robert C. Owen (Maxwell AFB, ...), 107.

Figure 12. Operation DELIBERATE FORCE Command Structure.

[219] Ashy, Joseph W, Interview with Robert C. Owen, 29 April 1996, Colorado Springs, Co. Transcript. ARHRA BACS H-4a.

[220] Mark A. Bucknam, "The Influence of UN and NATO Theater-Level Commanders on the Use of Airpower Over Bosnia During DENY FLIGHT: 1993-1995" (Ph.D. diss., University of London, 1999) 148.

Command Atmosphere

The command environment of DELIBERATE FORCE illustrates the particularly dynamic conditions under which the air campaign took place. American forces were operating under NATO command to achieve objectives authorized by the UN. Consequently, dual command structures were established by the respective international organizations. While this command arrangement violated the unity-of-command principle of war, it does not appear to have complicated the command environment, only to have inserted obstacles in the operational and tactical application of airpower. There was never any question of who exercised operational and tactical command or airpower assets. Rather, the obstacle to employment was the requirement of target-attack approval from both sides of the dual command structure. Although there were two distinct but interacting chains of command functioning during Operation DELIBERATE FORCE, the NATO chain was responsible for force application and is the command structure relevant to discussion here.

While the extent of Washington's control over NATO airpower remains unclear, it would seem that American political influence was limited to diplomatic efforts at the strategic level. Political-military involvement of the US in NATO was apparently limited to ministerial contact at the North Atlantic Council (NAC) between the respective ambassadors and SACEUR. Similarly, US political-military involvement through the UN was limited to the ambassador communicating through UN channels.[221] The following citation summarizes the political-military interaction at the strategic and operational level.

> Both the NATO and UN military commands were responsive to their respective civilian political masters. The NAC, the highest civilian body of the alliance, and Willy Claes, NATO secretary-general, exercised command authority over NATO forces through General Joulwan [SACEUR]. The UN Security Council exercised its authority through Boutros Boutros-Ghali, UN secretary-general. Yasushi Akashi, special representative to the UN secretary-general, exercised day-to-day civilian authority of the UN forces through General Janvier.[222]

[221] Bucknam, "Theater-Level Commanders," 198-99.
[222] Campbell, "The Deliberate Force Air Campaign Plan," 92.

Another venue of diplomatic interaction was the Contact Group. Representatives from the Contact Group countries of France, Germany, Great Britain, Russia and the US, were responsible for negotiating a settlement with the warring factions. Assistant Secretary of State Richard Holbrooke, US representative to the Contact Group, headed American diplomatic efforts. In its diplomatic capacity, the Contact Group acted independently of both UN and NATO command structures, and their negotiations were not coordinated with air operations. In fact, Admiral Leighton W. Smith, CINCSOUTH, made certain that Secretary Holbrooke did not have access to Lieutenant General Michael A. Ryan, COMAIRSOUTH, fearing that NAC members would poorly receive such interaction.[223] Such explicit support suggests that American strategic decision-makers may have been willing to defer judgement to NATO allies and attempt to shape the operation through diplomatic efforts at NATO's decision-making body, the North Atlantic Council (NAC). This does appear to have been the case. According to Richard Hunter, the US Ambassador to NATO, "All political decisions related to the air campaign had to be made at [the] NAC."[224]

Operational commanders were given a great deal of latitude to conduct the campaign. The NAC provided clear, yet broad, political objectives to military commanders.[225] The military leaders were then permitted to conduct operations in the most expeditious manner. The following analysis accurately captures the DELIBERATE FORCE command environment:

> NATO political authorities trusted the abilities of their military leadership to take general guidance and plan and execute military operations consistent with that guidance. One can attribute part of this trust to the perception that US and NATO military forces understand, and comply with the laws of war.[226]

In the context of Operation DELIBERATE FORCE, NATO airpower was viewed as a self-regulating instrument of power. Consequently, NAC politicians were able to

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[223] Ryan, Michael, Interview by Time Reagan and Wayne Thompson, 18 October 1995, audio tape, AFHRA BACS H-4a CAOC-24; Robert C. Owen, Interview with Author, 4 April 2000, Maxwell AFB Ala.; Robert C. Owen, "Summary," chap. in *DELIBERATE FORCE: A Case Study in Effective Air Campaigning* (Maxwell AFB, Ala.: AU Press, 2000), 500-01.
[224] Owen, "Summary," 501.
[225] Pollock, "Roads Not Taken," 433.
[226] Reed, "Chariots of Fire," 417.

delegate a great deal of authority and responsibility for execution to the operational commanders, Admiral Smith, and his air commander General Ryan. The operational commanders were free to employ airpower in the manner their expertise deemed most effective.[227]

The command concept during DELIBERATE FORCE can best be described as tightly controlled. According to Balkan Air Campaign Study (BACS) team member, Lieutenant Colonel John C. Orndorff, "[a] notable aspect of this air campaign was the strong and comprehensive leadership exercised by Lt Gen Michael Ryan, …from his combined air operations center (CAOC) with regard to strategy making, operational planning and even tactical actions."[228] It is difficult to determine if subordinate commanders understood adequately their superior's vision for conduct of Operation DELIBERATE FORCE. The leadership style of Admiral Smith and, to a much greater degree, General Ryan suggests they did not. General Ryan's extensive control over conduct of the operations underscores the reasoning behind this assertion. Since General Ryan "assumed that each tactical engagement could have profound strategic and political importance," he imposed close control over the tactical execution as well as dictating the overall direction of the campaign."[229] The air commander exercised control over the operation by restricting the flow of information in two key areas, target selection and battle damage assessment.

Target selection was one area of expertise the NAC was willing to delegate to operational-level commanders. CINCSOUTH was also willing to delegate target-selection authority. The responsibility to select targets was solely in the hands of COMAIRSOUTH, although his selections were subject to oversight by the NATO military committee, Supreme Allied Commander Europe (SACEUR), and CINCSOUTH. Well aware of the political sensitivities of the operation, General Ryan would not further delegate target selection.[230] General Ryan personally selected the Desired Munitions

[227] Bucknam, "Theater-Level Commanders," 213.
[228] John C. Orndorff, "Aspects of Leading and Following: The Human Factors of DELIBERATE FORCE," in *DELIBERATE FORCE: A Case Study in Effective Air Campaigning*, ed. Robert C. Owen (Maxwell AFB, Ala.: AU Press, 2000), 351.
[229] Orndorff, "Leading and Following," 355.
[230] Davis, "The Planning Background," 57.

Point of Impact (DMPI) for each mission and coordinated selection via telephone with CINCSOUTH. However, there was to be no 'free-lancing' by aircrews.[231] In fact:

> Aircraft could strike only assigned DMPIs—no targets of opportunity. The only valid target DMPIs are those assigned via the ATM [Air Tasking Message] process or directly assigned, real time, by the CAOC [Combined Air Operations Center] battle staff director…. Target DMPIs assigned via the ATM are only valid for the period of that ATM.[232]

Although responsive to the vision of the commander, the target selection process came at a price. Lieutenant Colonel Richard L. Sargent states that, "since Ryan handled the process for selecting DMPIs for each target, it was subject to frequent and sudden change."[233] Constant changes in targets were frustrating to tactical-level units who were employing force in the air campaign.[234] The tight control of target selection was a very effective method for striking the correct targets, but the failure to decentralize execution appeared to violate a tenet of airpower as noted in USAF basic doctrine. Frustration in aircrews and the failure to decentralize execution can have adverse effects on the effectiveness of airpower by inhibiting "initiative, situational responsiveness, and tactical flexibility."[235]

Another aspect of subjecting Operation DELIBERATE FORCE to tight control was the dissemination of Battle Damage Assessment (BDA). As in the targeting process, General Ryan reserved responsibility for overall combat assessment. General Ryan and Admiral Smith at Naples closely controlled BDA reports from moving up or down the chain of command. In fact, the only dissemination of BDA outside the CAOC was to Admiral Smith. Admiral Smith made the decision to keep a "close hold" on the outflow of BDA information to NATO governments and the media.[236] Tactical units complained about inadequate BDA because its absence influenced tactical effectiveness. Without the most current target information, aircrews did not know the status of their assigned target. Many pilots correctly suspected that they were going against targets that had already been

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[231] Ryan, interview.
[232] Reed, "Chariots of Fire," 416.
[233] Richard L. Sargent, "DELIBERATE FORCE Targeting," in *DELIBERATE FORCE: A Case Study in Effective Air Campaigning*, ed. Robert C. Owen (Maxwell AFB, Ala.: AU Press, 2000), 290.
[234] Reed, "Chariots of Fire," 416.
[235] AFDD1, *AF Basic Doctrine*, 22-23.
[236] Owen, "Summary," 493.

destroyed.[237] Inadequate communication of BDA down the chain of command to tactical units reflected the attitude in the CAOC that political considerations overrode tactical necessity. This sentiment is expressed nicely by Major Mark McLaughlin, of the BACS team.

> Colonel [Daniel] Zoerb [director of the AIRSOUTH DENY FLIGHT air-operations cell] acknowledged the frustration of the Aviano pilots over the imperfect communication of BDA to the units but stressed that the established BDA system served a broader agenda than simply telling field units how well they were doing. He later explained that "internal release of BDA information was restricted to prevent this information from being misrepresented (unintentionally) to NATO and the nations…"[238]

General Ryan had two reasons for restricting the flow of BDA up the chain of command. First, by maintaining tight control on BDA it was easier to keep the Serbs in the dark about NATO operations and intentions. Second, it also preserved military autonomy in the conduct of the campaign. Tight control on BDA kept NATO political authorities from "assisting" the commanders with operational decisions. According to General Ryan:

> We didn't let Washington control it [BDA], or any of the other nation's capitals control it, because you didn't want to have people second-guessing what you were doing. The people you wanted second-guessing what you were doing were the Serbs, not the capitals.[239]

This is not an indictment of General Ryan's leadership style. In fact, given the unique circumstances surrounding Operation DELIBERATE FORCE, the hands-on role taken by COMAIRSOUTH was probably the most effective way to execute the air campaign. General Ryan had the physical capability to exercise tight control of targeting and BDA from the CAOC in Vincenza and, in the absence of guidance from his superiors, the charter to do so. He was, to a greater degree than political leaders, more concerned with collateral damage.

> While the general was concerned that a significant collateral damage even, particularly one causing the deaths of civilians, might rob the air campaign

[237] Mark C. McLaughlin, "Combat Assessment: A Commander's Responsibility," in *DELIBERATE FORCE: A Case Study in Effective Air Campaigning*, ed. Robert C. Owen (Maxwell AFB, Ala.: AU Press, 2000), 184.
[238] McLaughlin, "Combat Assessment," 185.
[239] Bucknam, "Theater-Level Commanders," 225.

> of its political support before it had decisive effect, the US diplomats involved generally believed that the air campaign had enough political support perhaps even to carry it through a serious incident of collateral damage.[240]

Diplomatic ambivalence regarding collateral damages appears to extend beyond the US. Robert Hunter, the US ambassador to NATO pointed out that, "too much domestic political capital had been invested by the [NATO] member states to start bombing operations for them to be brought to a halt by the unintended death of civilians and soldiers."[241] That is not to imply that diplomatic authorities were insensitive to collateral damage, only that the military commanders were more attuned to the adverse repercussions of such occurrences. Christopher Hill, Ambassador Holbrooke's deputy negotiator in the Contact Group, stated that "concern for collateral damage appears to have been a constraint self-imposed" by NATO commanders.[242]

Additionally, he appreciated the political dynamics of the NATO action. The consensus of analysts writing the Balkans Air Campaign Study indicates that:

> …General Ryan's exceptional involvement in the tactical details of Deliberate Force reflected both his prerogatives as commander and an appropriate response to the political and military circumstances of the operation. The NATO air forces involved were small in relation to the capacities of command, control, communications, and intelligence systems available to find targets, monitor and direct forces, and maintain command linkages. Drawing on the analogy of an earlier commander standing on a hill, …General Ryan had the sensory and cognitive capability to embrace the air battle comprehensively, assess the tactical and strategic flow of events, and direct all of his forces in a timely manner. In the words of one senior US Air Force leader, therefore, General Ryan not only could exercise close tactical control over his forces but also was obligated to do so.[243]

General Ryan's concern for collateral damage, tight control of BDA, and prerogative to retain targeting authority reflected his overall belief that military commanders were ultimately responsible for the success or failure of the operation. Therefore, General

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[240] Robert C. Owen, "The Balkans Air Campaign Study: Part 2," *Airpower Journal* 11, no. 3 (Fall 1997): 17-18.
[241] Owen, "BACS, Part 2.," 18.
[242] Ambassador Christopher Hill, US State Department deputy chief negotiator, interviewed by Lt Col Rob Owen, Washington, D.C. 27 February 1996; in Campbell, "The Deliberate Force Air Campaign Plan," 125.
[243] Owen, "Summary," 487.

Ryan placed himself in the critical command position, knowing fully that he would take the blame if anything went wrong.[244] In order to ensure this campaign of limited ends and means was fought according to political guidance, General Ryan had to steep himself in tactical execution. Consequently, the command concept of Operation DELIBERATE FORCE appears to have been directly communicated by its leading airman. Subordinate commanders simply had to follow COMAIRSOUTH direction.

Technological Baseline

To direct the air war effectively, General Ryan moved from his headquarters in Naples to the CAOC in Vincenza. He saw the CAOC as the most "forward element of the command structure."[245] Efforts to upgrade the communication capabilities of the CAOC had been initiated by the previous COMAIRSOUTH, Lieutenant General Joseph Ashy. General Ryan worked "feverishly" throughout the summer of 1995 to complete the upgrades.[246] As DELIBERATE FORCE began the CAOC was ideally suited for the command-and-control of the campaign. Operations in the CAOC gave General Ryan a prominent point from which to oversee and control the events of DELIBERATE FORCE.

In terms of technical means of communication, CAOC equipment included a robust system of Satellite Communication (SATCOM) and Line-of-Sight Ultra-High Frequency (UHF) radios, Voice and Data-link connectivity, as well as secure and direct point-to-point telephone connections.[247] Examination of the correspondence files maintained by Major General Hal Hornburg, the CAOC Director, indicates these means were used to transmit communications via facsimile and voice. Additionally, NATO standard messages and video teleconferences (VTC) were used to transfer information up and down the chain of command.[248]

While these communication links gave the CAOC connectivity with higher headquarters and permitted control of the TACS, there were two major limitations in the system. The first was the absence of a direct link between the CAOC and mission

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[244] Conversino, "Executing DELIBERATE FORCE," 136.
[245] Ryan, Interview.
[246] Owen, "Summary," 482.
[247] "CAOC Tutorial for Operation DENY FLIGHT Briefing," No date. AFHRA BACS G1, AVI-60; HQ 16 AF, "History of 16 Air Force 1 January-31 December 1995: Air Operations Center Concept of Operations," (Aviano AB, IT: Unit History, No Date). AFHRA BACS B1b(2)-1 CAOC-35.
[248] Hal Hornburg, "CAOC Director Correspondence Files," August 1995. AFHRA BACS B1c-1 CAOC-7; Hornburg, "CAOC Director Correspondence Files," September 1995. AFHRA BACS B1c-1 CAOC-8.

aircraft. In the absence of direct communications linkage, NATO Airborne Early Warning (NAEW) aircraft were required to relay transmissions to combat aircraft in the area of operations.[249] The second major communication limitation was the lack of direct contact between the CAOC and ground forces requiring air support. This deficiency was overcome by using the Airborne Battlefield Command-and-control Center (ABCCC) as a real-time link to control the air war for the CAOC.[250]

Despite the above deficiencies, General Ryan was sufficiently connected to higher headquarters and the TACS to conduct Operation DELIBERATE FORCE effectively. General Ryan's control over information flowing into and out from the CAOC suggests communication was his most important mechanism for command-and-control of NATO airpower. The important point to emphasize is that the decision not to disseminate information outside the CAOC, in particular BDA, was not limited by technology. It was General Ryan's choice.[251]

DENY FLIGHT

In order to understand the command-and-control of airpower during DELIBERATE FORCE, it is necessary to look at the operation in a larger context. Operation DENY FLIGHT provides the context under which DELIBERATE FORCE took place. DENY FLIGHT was a NATO military operation that took place from April 1993 to December 1995. The NATO mission, under the authority of United Nations Security Council Resolution (UNSCR) 816, was to support the implementation of the Peace Agreement on Bosnia-Herzegovina. NATO aircraft were responsible for the enforcement of a No-Fly Zone in the airspace of Bosnia-Herzegovina, for providing Close Air Support to UN troops on the ground, and for conducting airstrikes at the request and approval of UN leaders.[252] NATO airpower became the *de facto* air component of the UN for DENY FLIGHT, and as previously mentioned, this created parallel command structures with a "dual-key" authorization requirement.

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[249] L. Dean Simmons, "Bosnia Air Operations—Lessons Learned" Mid-Term Review Briefing (Alexandria, Va.: Institute for Defense Analyses, 19 April 1996): 10. AFHRA K570.01.
[250] Ripley, "Air War Bosnia," 92.
[251] McLaughlin, "Combat Assessment," 184.
[252] Frank Veltri, "Operation DENY FLIGHT Factsheet," (Washington, D.C.: Navy Office of Information, 21 December 1995): 1. http://chinfo.navy.mil/navpalib/intl/bosnia/denyflt.txt, 11 April 2000.

Two particular events during DENY FLIGHT show how the C2 system reacted to requests for air support. These events had a profound effect on DELIBERATE FORCE because they provided an impetus for changing the command-and-control structure. The first event took place on 12 March 1994 in the vicinity of Bihac. A French Tactical Air Control Party (TACP) requested air support to strike a Bosnian Serb mortar position. A NATO AC-130 gunship was available to assist and located the target. It took over six hours to obtain strike approval from the UN chain of command, during which time the target relocated and was lost.[253] The second event was the fall of Srebrenica. From 6-10 July, Serbian forces repeatedly attacked the UN designated safe-area. During this period the Dutch peacekeepers responsible for defense of Srebrenica had repeatedly requested air support and been subsequently denied approval by the UN chain of command. On 11 July 1995, the final Serb assault to capture the city began. Force Commander, UN Peacekeeping Forces, Lieutenant General Bernard Janvier turned the UN key when he signed a 'Blue Sword' order authorizing close air support.[254] NATO CAS aircraft were on station but they were "too-little, too-late."[255] Air support for the peacekeepers was terminated when Joris Voorhoeve, the Dutch Minister of Defense called a halt to airstrikes. Upon realizing the effort was futile, Voorhoeve "phoned directly from The Hague to a Dutch officer at NATO's air operations center [CAOC] in Vincenza and ordered an immediate end to the air operations."[256] Voorhoeve similarly telephoned UNPF headquarters in Zagreb to call off the air strikes, "because it [continued strikes] would not have saved the enclave [Srebrenica] but would have added to the risks for the refugees and peacekeepers."[257]

These two instances gave NATO political and military leaders cause to question the "dual-key" command-and-control process. NATO leaders took steps to reduce UN influence in the approval process during the 21-25 July 1995 London Conference. Comments made by the US Secretary of State, Warren Christopher shortly after the conference imply that American leaders expected the UN's role in tactical decision-

[253] Boyd, Lowell R. Interview by Lt Col Robert C. Owen, 6 December 1995. Audio tape. AFHRA BACS H-4a NPL-30.
[254] Bucknam, "Theater-Level Commanders," 187-188.
[255] Ryan, interview.
[256] Bucknam, "Theater-Level Commanders," 189.

making to diminish.[258] According to BACS Director Colonel Robert C. Owen, the true significance [of the London conference] on the command-and-control of airpower, was "it removed Ambassador Akashi [UN Secretary-General's Special Representative] from the decision-making process and delegated the UN 'key' to military leaders [Lt Gen Janvier and Lt Gen Rupert Smith]."[259] Consequently, although the dual-key system was still operative, the UN role was diminished and NATO officers had a stronger role then they had previously enjoyed in making strike decisions.

Operation DELIBERATE FORCE

"Although initiated in response to the BSA shelling of the Sarajevo marketplace on 28 August 1995, Operation DELIBERATE FORCE was the culmination of events and related planning over a long period."[260] Operation DELIBERATE FORCE actually constituted a particularly intense phase of DENY FLIGHT. It took place under the same concept of operations and command umbrella.[261] While the command structure may have mirrored DENY FLIGHT, the procedural command in the wake of the London Conference did not. This procedural change was further compounded on 29 August when Kofi Annan, acting in UN Secretary-General Boutros Boutros-Ghali absence, gave up the UN's veto authority over airstrikes for a limited period. The decision to commence air strikes was now solely in the hands of NATO leaders. Additionally, at nearly the same time, NATO Secretary-General Willy Claes *informed* NATO members that he had authorized SACEUR and CINCSOUTH to take military action if deemed appropriate. [262] Under this context and when BSA responsibility for shelling a Sarajevo marketplace was determined, Admiral Smith and Lt Gen Smith agreed to launch Operation DELIBERATE FORCE.[263]

Initial NATO airstrikes began on 30 August, with strike packages attacking the Serbian Integrated Air Defense System (IADS) in Southeast Bosnia-Herzegovina. Five

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[257] Joris Voorhoeve, "Protecting the Peacekeepers on the Day Srebrenica Fell," *Washington Post* 118, no. 350, 20 November 1995, A20.
[258] Robert C. Owen, "The Balkans Air Campaign Study: Part 1," *Airpower Journal* 11, no. 2 (Summer 1997): 19.
[259] Owen, interview.
[260] White Paper, "Operation DELIBERATE FORCE 'Fact Sheet'," 1. AFHRA BACS H5 NPL-16-01.
[261] Conversino, "Executing DELIBERATE FORCE," 132.
[262] Richard Holbrooke, *To End a War* (New York: Random House, 1998), 99.
[263] Bucknam, "Theater-Level Commanders," 208.

subsequent waves of strike aircraft hit targets in the vicinity of Sarajevo. Attacks near Sarajevo on 31 August targeted additional IADS elements, ammunition depots, equipment storage, and maintenance facilities.[264] The first two days of DELIBERATE FORCE prosecuted the already approved target sets that appeared on the pre-planned operation Air Tasking Message (ATM). A suspension in combat operations, requested by Lt General Smith on 31 August to support negotiations, was honored on 1 September. Admiral Smith and General Janvier gave approval to orders halting bombing. This cease-fire was subsequently extended until 5 September, at which time Smith and Janvier authorized General Ryan to resume the air campaign.[265]

Although not actively attacking BSA forces during the 1-5 September pause, NATO airpower remained active. General Ryan had mission planners build ATMs and placed strike aircraft on ground alert, in the event they were needed. Close Air Support, Suppression of Enemy Air Defenses (SEAD), and C2 assets were constantly airborne.[266] General Ryan exercised and control over airpower by delegating strike authority to Major General Hal Hornburg, the CAOC director of operations (DO), whose callsign in the TACS was 'Chariot.' Chariot had several means at his disposal with which to ensure ATM execution occurred in accordance with General Ryan's vision. In addition to communication assets in the CAOC, General Hornburg had NATO Airborne Early Warning (NAEW) and ABCCC aircraft, 'Longbow' the UN Air Operations Command Center (AOCC) in Sarajevo, as well as US Navy air and sea based C2 platforms available to control operations.[267] The TACS was particularly relevant during this cease-fire because Chariot had the authority to launch the alert strike aircraft, and he retained General Ryan's delegated authority to approve weapons release by strike or CAS aircraft.[268]

Negotiations failed to reach an acceptable agreement, and on 5 September the force application phase of DELIBERATE FORCE resumed. During the remainder of Operation DELIBERATE FORCE strike missions were accomplished by tasking units in

[264] White Paper, "Operation DELIBERATE FORCE 'Fact Sheet'," 3-4.
[265] Conversino, "Executing DELIBERATE FORCE," 147.
[266] White Paper, "Operation DELIBERATE FORCE 'Fact Sheet'," 1-2.
[267] Conversino, "Executing DELIBERATE FORCE," 161-62.
[268] "CAOC Operations Log," 30 August-20 September 1995. AFHRA BACS B1b NPL-12-01; "CAS Duty Log," 30 August-20 September 1995. AFHRA BACS B1b NPL-12-02.

the ATM. However, General Ryan exerted control and direction of the air operations by using combat assessment to determine target selection. Strike operations from 6-13 September reflect an increased number of re-strikes.[269] In the context of the Balkan air campaign, re-strikes were attacks against target previously hit, but not assessed to have been damaged sufficiently. General Ryan, "personally retained authority to add and remove targets from the master attack plan [of the ATM cycle], authorized removal of a target from this plan when it was 'two-thirds' destroyed."[270] A re-strike on a target was accomplished by tasking it on a subsequent ATM, or by re-tasking airborne CAS aircraft using elements of the TACS.[271]

Offensive operations were suspended once more on 14 September when a letter from Lieutenant General Janvier informed CINCSOUTH that the warring factions had accepted the UN-brokered Framework Agreement. Operation DELIBERATE FORCE officially ended on 20 September when Admiral Smith and Lieutenant General Janvier agreed that the operation's objectives had been met.[272] It is important to note that during the conduct of Operation DELIBERATE FORCE, the operational-level military commanders in the "dual-key" chain of command had the authority to start and stop military operations. At the acquiescence of the NATO and UN strategic level players, Admiral Smith and General Janvier apparently had the freedom to pursue the most effective military course of action. Once the decision to fight or pause was made, General Ryan appears to have had great latitude in the timing and execution of those decisions.[273]

Observations

Two factors suggest that assessing command-and-control during Operation DELIBERATE FORCE requires a focus on the operational level. The first is the command environment. Following the London Conference, when the NATO chain of command became the dominant control structure, operational commanders were responsible for accomplishing a broad mission with little interference from superior echelons. The second factor is the control of information at the operational level. While

[269] White Paper, "Operation DELIBERATE FORCE 'Fact Sheet'," 5-6.
[270] McLaughlin, "Combat Assessment," 183.
[271] White Paper, "Operation DELIBERATE FORCE 'Fact Sheet'," 6.
[272] White Paper, "Operation DELIBERATE FORCE 'Fact Sheet'," 1-2.

Admiral Smith and General Ryan may have been controlling BDA and target selection to maintain military autonomy, it had a secondary effect. By tightly controlling the flow of information, the operational commanders accentuated the significance of the operational level of war. The operational level became a virtual nexus of information. Communications up and down the chain of command seem to have been centered around the operational commanders, and in particular, around operations at the CAOC.

Strategic direction of Operation DENY FLIGHT, and to a greater extent Operation DELIBERATE FORCE, was expressed in terms of broad policy guidance and Rules of Engagement.[274] Transmission of these higher headquarters directives took place using time-tested standard message format, facsimile, and letter.[275] The important point to consider about the conduct of DELIBERATE FORCE is that strategic-level leaders communicated their intentions to the operational-level military commanders and then gave them the latitude to conduct operations without undue interference from above. NAC members apparently trusted the military commanders to accomplish the mission in the most effective manner. Since General Ryan took such great pains to limit collateral damage, there seemed little reason for senior leaders to intervene. Additionally, although Admiral Smith and General Ryan were not forthcoming with BDA, they did keep the NATO Secretary-General, and therefore NAC members, well informed of the air campaign's status and progress.[276] Complementing this was SACEUR's media policy for Operation DELIBERATE FORCE. The intent of General Joulwan's policy was to formalize a requirement that operational commanders pass information properly up the chain of command. NATO officers had to get approval from Brussels before making any statements to the press. It was "aimed at preventing news from reaching NATO ambassadors via their television sets…"[277] This suggests that so long as the operational commanders were providing adequate information to the strategic decision-makers, there was little need to seek details from tactical-level sources.

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[273] Conversino, "Executing DELIBERATE FORCE," 136-58.
[274] Owen, interview.
[275] HQ USAFE, "History of USAFE Vol. 19," (Ramstein AB, GE: Unit History, 1 Jan-31 Dec 95). This volume provides supporting documents illustrating the interaction between strategic level politicians and operational commanders regarding key decisions of DELIBERATE FORCE. For details on strategic to operational communication see: Message, 231645Z JUL 95, USMSN USNATO to multiple addresses, 23 July 1995; Message, 240504Z JUL 95, SECSTATE to multiple addresses, 24 July 1995. AFHRA K570.01.
[276] Bucknam, "Theater-Level Commanders," 225.

Likewise, communications from the operational level affecting tactical airpower emanated from the CAOC. As mentioned earlier, General Ryan was very involved in the tactical aspects of the campaign and focused command attention on critical decisions that would support the achievement of campaign objectives.[278] The primary means of command-and-control appear to have been the ATM and real-time ATM changes from the CAOC through the TACS.[279] Access to information and, in particular, combat assessment results appear to have been a major instrument of command-and-control during Operation DELIBERATE FORCE. In this regard, information flow from the strategic to tactical level was almost nonexistent. Tactical units repeatedly sought, often to no avail, the most current information on the status of assigned targets. This however says more about the human involvement in the process than the technical means of communicating. The decision not to disseminate BDA to the tactical units was not limited by technology. It was General Ryan's choice to control the flow of information, and he rightly exercised his prerogative of "intentionally reserving for himself the responsibility for overall combat assessment."[280]

The tight control of information maintained by operational level commanders may have had an influence on communication between the strategic and tactical levels. By firmly metering access to combat assessment the operational commanders seem to have made themselves indispensable. Parties at the strategic or tactical level were forced to seek information from the operational level. This, and the willingness of strategic level leaders to allow operational commanders to run the campaign in the most efficient manner, may explain the absence of skipping-echelon examples. Although the capability for strategic leaders to communicate directly with tactical players did exist, there are no known cases of this happening during DELIBERATE FORCE.[281] Even the one apparent example of skipping-echelon illustrates the channels through which strategic intervention took place. When Dutch Minister of Defense Joris Voorhoeve called off air support for

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[277] Ibid., 223.
[278] Orndorff, "Leading and Following," 377.
[279] "Operation DELIBERATE FORCE Factual Review Vol. 5 of 7," This collection of supporting documents indicates the CAOC used the ABCCC as a radio relay to direct ATM changes in near real-time. AFHRA BACS B1b NPL-12-01.
[280] McLaughlin, "Combat Assessment," 184.
[281] Owen, interview.

the peacekeepers near Srebrenica, he contacted officers at the respective operational level command centers.

Operation DELIBERATE FORCE demonstrates that while technology is frequently a necessary means for command-and-control, human decisions and qualities are vital in how that technology will be used. Clearly, national and theater strategic level commanders had the technical ability to become deeply involved in details of the air campaign. But they chose not to do so for two reasons: first, the failure to save Srebrenica from Serb attack had demonstrated the folly of over-involvement; second, Admiral Smith and General Ryan had earned their trust and confidence. The flip side of the coin is indicated at the operational-tactical interface. Here, General Ryan had the technical means to exercise detailed supervision of tactical events and he chose to use them. The intensely political nature of the campaign drove him to do it, and the campaign's limited scope and duration attenuated the adverse effects of his decision.

Chapter 5

Conclusions

If commanders are allowed to exercise their own initiative, those above will need to show self-restraint.

--Lawrence Freedman

The purpose of this study has been to ascertain the effect the information environment, with primary emphasis on the information technology aspect, has had on the relationships among the three levels of war. The issue is not only how the relationships have been affected but also, how these changes have influenced the traditional command hierarchy. In particular, has information technology eliminated or significantly reduced the requirement for operational-level command echelons? Examining the influence of information technology on the strategic-operational interface and the operational-tactical interface for each case study will provide the answers to these questions.

Strategic-Operational Interface

The influences of information technology on the strategic-operational interface during Vietnam appear to have been substantial. They were substantial in that information technology apparently limited interaction among the various levels largely to communications between the strategic and operational levels. Although President Johnson may have been inclined to become deeply involved in tactical details, as evidenced by the Tuesday White House decision-making sessions, he apparently lacked the means to intervene directly in the execution of those tactical details. While it would be pure speculation to assert that, given the necessary technical means, President Johnson would have interfered at the tactical-level, at least one salient point can be made. Regardless of the president's intent to control the war tightly from Washington, technological limitations precluded the Commander-in-Chief from skipping the operational level command echelon.

During the conduct of the war, messages used to command-and-control air actions such as FLAMING DART, ROLLING THUNDER, NIAGARA, and LINEBACKER, followed the established chain of command. Additionally, since WWMCCS architecture

did not connect to tactical-level units to higher levels of authority, any command-and-control activities utilizing this system took place between the strategic and operational levels. Assessing communications up the chain of command from operational to strategic levels indicated an inadequate military reporting system. This observation implies a technological shortcoming was to blame. However, that does not appear to be the case. The expectations of strategic leaders, namely President Johnson and Secretary McNamara, prompted operational level sources to inundate the reporting system with irrelevant information.

For the subsequent case studies, information technology does not appear to have affected the command relationships at the strategic-operational interface to the degree evident during Vietnam. This is partly due to the fact that the years leading up to the Persian Gulf War witnessed efforts to overcome many of the Vietnam-era information technology limitations. The robust, satellite-based, communications system in place during Operation DESERT STORM gave strategic leaders direct, abundant, and potentially unfettered access to the entire theater. Despite this capability, communications took place within the established chain of command. The evidence in the DESERT STORM case study suggests information technology had very little influence on the strategic-operational interface. Rather, it was the personal leadership style of strategic leadership, along with organizational changes that resulted from both the passage of the Goldwater-Nichols Defense Reorganization Act and the doctrinal establishment of the JFACC that best explain interaction at the strategic-operational interface. President Bush most certainly had the technical means available that would allow him to interfere directly with tactical execution. That he elected not to do so implies his intent to provide operational-level commanders with the freedom of action to conduct military operations. The impact of Goldwater-Nichols was the increased authority available to the theater CINC, while designation of the JFACC established a single operational level air commander. Together these two organizational modifications emphasized the significance of the operational level. Additionally, the politically astute Chairman of the Joint Chiefs, General Powell, was determined to ensure that the theater commander prosecuted the war. His actions to monopolize communication flow into the theater established a clear channel between Washington and Riyadh and characterized the

relationships at the strategic operational interface. Consequently, the strategic-leaders, with the technical means to interfere with tactical execution, rightly directed their oversight to the operational-level commanders.

Similarly, information technology during Operation DELIBERATE FORCE does not appear to have had a significant influence on the strategic-operational interface. Using essentially the same technology available during Operation DESERT STORM, strategic-leaders in the NAC took a *laissez-faire* approach to DELIBERATE FORCE. The NAC and SACEUR trusted the operational commanders, Admiral Smith and General Ryan, to conduct the air campaign properly. NAC leaders largely viewed airpower and military forces in general as a self-regulating instrument of power that required only minimal oversight. Consequently, the evidence suggests the human element of the command-and-control process to be more significant than the influence due to information technology. Nowhere is this more evident than in two specific events in the days prior to Operation DELIBERATE FORCE. When CAS was requested to strike Serb armor near Bihac and when airpower was needed to prevent the fall of Srebrenica, the command-and-control process failed. The common denominator in these two examples indicates that the ineffectiveness of airpower was not a technological problem, but rather a human failing. It took far to long to obtain a decision on strike authority from the "dual-key" command structure for airpower to have a decisive effect.

Operational-Tactical Interface

In all three case studies, information technology appears to have had significant influence on the operational-tactical interface. Information technology has affected the operational-tactical interface by allowing a progressively more effective transfer of information. In Vietnam, information technology advances enhanced the effectiveness of the TACS in the form of improved radios, automatic mission fragging capability, and the incorporation of the ABCCC. As a result, the 7 AF/CC was able to use the TACS to provide the US Army with responsive CAS. ABCCC proved to be a versatile extension of the TACC and provided the 7 AF/CC the means to extend his authority over greater tactical distances. Still, although operational-level air commanders may have possessed real-time communications, they lacked a real-time command-and-control capability. The

failure of COMBAT LIGHTNING to meet expectations serves as an indicator of the TACS limitations.

Another significant issue at the operational-tactical interface in Vietnam was unity of command. The operational-level air command structure was fractional and affected the tactical employment of airpower adversely. While the decentralization of command may have segregated each service's assets into distinct command-and-control channels and represented an inefficient use of airpower, it appears to have had little bearing on the operational-tactical interface. The TACS provided command-and-control service to all friendly air assets, regardless of their organizational origins. Any interoperability problems merely highlight the technical limitations of the era. The existence and use of the TACS implies that information technology had an influence on the operational-tactical interface during Vietnam.

The operational-tactical interface during Operation DESERT STORM was affected by the technological improvements since Vietnam. The TACS based in Riyadh was greatly improved over its Saigon predecessor. The TACS, with the addition of JSTARS, AWACS, and space-based assets, embodied a formidable command-and-control capability. As a result, TACC duty officers were able to optimize aircraft mission effectiveness through real-time ATO changes. Additionally, airpower assets were able to destroy Iraqi armor by relying on the TACS to direct Killer Scout and "tank-plinking" missions. While information technology undoubtedly aided operational to tactical communications, technology is not the only influence on the operational-tactical interface. The JFACC played a central role in the command-and-control of airpower in the Gulf War. The establishment of a JFACC, despite grudging inter-service acceptance, affected the operational-tactical interface profoundly. The JFACC, supported by a highly capable C2 system, signaled the emerging significance of the operational-level air commander as the dominant figure in the command-and-control of airpower. In addition to his central role, General Horner's personality played a part in the definition of the operational-tactical interface. His willingness to trust subordinates and let the TACS respond to requests for airpower, without his personal involvement, illustrates the complementary role human nature and technology play within the C2 system.

Information technology had significant influence on the operational-tactical interface during Operation DELIBERATE FORCE, and that influence was accentuated by the actions of the operational level commanders. General Ryan had the technical means available to control the air campaign tightly from the CAOC. Acutely aware of the political sensitivities of the operation, General Ryan retained sole responsibility for target selection. Similarly, General Ryan and Admiral Smith reserved for themselves, the authority to release BDA results to tactical units. In both examples, technology enabled tight control at the operational-tactical interface, but it was command decisions that effected such control. Strategic leaders granted operational-level commanders the autonomy to conduct air operations. General Ryan seized this charter and with the requisite technical means at his disposal, exercised tactical control over the air campaign. While, information technology provided General Ryan the tools to command-and-control airpower effectively, his predilection to exercise tight command-and-control over the campaign had the most significant effect on the operational-tactical interface.

Relevance of the Operational Level

The information technology improvements that occurred over the time period covered by the three case studies have not eliminated or reduced the requirement for operational level command echelons. In fact, these improvements have accentuated the importance of the operational echelon for the command-and-control of airpower. During Vietnam operational-level commanders were ultimately responsible for translating strategic guidance for operations such as NIAGARA, and LINEBACKER, into military action. While the strategic guidance may have been more tactically focused than operational commanders wanted, this guidance merely restricted the flexibility of military options, particularly during FLAMING DART and ROLLING THUNDER. The reasons for the apparent lack of strategic-tactical interaction, whether determined by technical challenges or personal prerogatives, are debatable. Whatever the reason, observations that strategic leaders relied on operational commanders to achieve policy objectives, and the role operational-level air commanders played through the TACS suggest the operational level of war was indeed important to the command-and-control of airpower.

In the case of Operation DESERT STORM, the central role played by the JFACC would indicate greater reliance on the operational-level command echelon.

Organizational changes brought about by Goldwater-Nichols strengthened the authority and indicated the significance of the operational level. Additionally, the willingness of strategic leaders in Washington to allow operational commanders the autonomy to conduct DESERT STORM underscored the importance of the operational level. Rather than reducing or eliminating the significance of the operational level, information technology appears to have had the opposite effect. The enhanced technical capabilities available during the Persian Gulf War provided the centralized, operational-level air commander with an effective means, in particular, a highly responsive TACS, with which to command-and-control airpower.

The operational-level commanders during Operation DELIBERATE FORCE took center stage in the conduct of the air campaign. This is due in part, to the willingness of SACEUR and NAC strategic leaders to give operational leaders great latitude in the conduct of military operations. Another reason for the apparent primacy of the operational level resides in the personality of the operational level air commander. General Ryan's assessment of the political climate under which DELIBERATE FORCE took place and his realization that the scope and scale of air operations would be limited to a manageable size, prompted him to control the campaign tightly from the CAOC. Furthermore, the technical means at the CAOC enabled him to do so. Examining the flow of information during the DELIBERATE FORCE provides one of the strongest arguments regarding the continued relevance of the operational level in the face of improving information technology. By personally selecting DMPIs and controlling access to BDA, General Ryan used the distribution of information to make the operational level the focal point of Operation DELIBERATE FORCE. Since the operational level took on such a central role, the decisions to control of information, rather than the technology to transmit the information, appear to be the most influential factor. Information technology simply appears to have made it possible for General Ryan to conduct the air campaign in the manner he deemed appropriate. Consequently, the evidence implies that personalities at the strategic and operational levels recognized the significance of the operational-level command echelon. General Ryan's decisions to control information flow, facilitated by information technology, maintained the relevance of the operational-level of war during Operation DELIBERATE FORCE.

Conclusions

By examining the influences that information technology has had on the command-and-control of airpower in Vietnam, Operation DESERT STORM, and Operation DELIBERATE FORCE, two major conclusions emerge. First, while there is no doubt that information technology exerts influence on the command-and-control of airpower, the relationships among the levels of war appear to be defined more by personal leadership style than by technical means. Information technology is merely an important enabler for the command-and-control of airpower. Second, the current three-level construct of war is likely to remain relevant. Evidence from the three case studies indicates that the traditional chain of command hierarchy was sufficient for the command-and-control of airpower. That is not to imply that the relationships will remain static in the face of information technology changes. Improvements in the ability to command-and-control airpower may modify the construct slightly; but the strategic, operational, and tactical levels will survive. The strategic level, by virtue of the political nature of war, will remain dominant. The operational level will remain relevant because strategic-leaders require the expertise of operational-level commanders to employ airpower in the complex and specialized contemporary battlespace. Similarly, the operational level commander provides a single focal point for the effective and efficient employment of airpower. The tactical level of war, as the instrument of force application will likewise remain relevant.

In sum, information technology has had little effect on the strategic-operational interface. The relationships between commanders at the strategic and operational levels are more a function of the command environment established by the strategic leaders than a function of the available technology. Although information technology appears to affect operational-tactical interface to a greater degree, by enabling more effective command-and-control, the command relationships between these two levels are largely determined by the human element as well. The relationships at the respective interfaces suggest that information technology is not reducing or eliminating the requirement for operational level command echelons. On the contrary, the operational level of war is taking on increasing significance.

Chapter 6

Implications

Whatever the advances [in Information Technology], war's fog will remain as resistant to technological fixes as the common cold has to modern medicine.
--David M. Keithly and Stephen P. Ferris

Military organizations that did not adapt in a rapidly changing, highly competitive environment have declined, often quite quickly.
--Andrew F. Krepinevich

The extent to which changing information technology will continue to influence the relationships among the levels of war is a question only time can answer. However, because war is primarily a human affair, the human elements of command-and-control will have relevance in the future. As the conclusions of this study point out, command-and-control is primarily a human process that is facilitated by the application of information technology. Recognition of the primacy of the human component in the C2 system brings with it several implications. First, information technology must remain in a supporting role. Information technology must enhance the C2 system, but not overpower the human component. Second, future efforts to improve C2 systems must focus not on developing the technological aspects, but rather, on the commander. A premium should be placed on developing leadership skills. The C2 system can then be built around the commander. After all, a sophisticated C2 system can make great leaders better, but the opposite is not necessarily true. Third, doctrinal publications must place emphasis on the human component of command-and-control. Joint Publication 1-02 currently emphasizes control at the expense of command; this highlights the wrong point of inflection. The fourth implication regarding the human nature of command-and-control is the need for user discipline. Information technology currently can support the transmittal of vast quantities of data and it is likely that future systems will be even more prolific. Consequently, user discipline becomes an important consideration. Senders and receivers will need training in how to send only relevant and accurate information in the most succinct manner.

The study of airpower command-and-control during Vietnam, Operation DESERT STORM, and Operation DELIBERATE FORCE indicates that information technology is not reducing the importance of the operational level of air warfare. If anything, organizational and technological changes, complemented by strong leadership, appears to have strengthened the operational level. It is strengthened in that the operational-level air commander has control of information. A consequence of this has been increasing centralization of authority, and of the technical means to command-and-control, at the operational level. If this trend continues, centralization may become vulnerability. In effect, the operational-level assets at the AOC offer a high-value and lucrative target to enemy forces. The attractiveness of this vulnerability will have to be overcome. Perhaps the most obvious solution is to decentralize. Distributing or networking the C2 system to provide redundancy and survivability will at least reduce the vulnerability. Information technology will be instrumental in this process of decentralization. Distributed data or network communications systems imply a horizontal rather than vertical command arrangement and this may have implications for future command arrangements. In deference to Andrew F. Krepinevich's observation at the beginning of this chapter, there may be a strong desire to modify command relationships in order to survive and win the future air battle.[282] That is not to say that the military hierarchy will flatten out to match the flow of information. Some experts argue that military command organizations will shift horizontally, but others, recognizing the unique command requirements of the armed forces, assert that the vertical chain of command hierarchy will remain largely intact.[283] In the future, commanders will have to balance the dynamics of a vertical chain of command with the horizontal transmittal of information that gives access to all levels of war simultaneously.

Naturally, this study is not the last word on the influence of the information atmosphere on the command-and-control of airpower. The employment of airpower in Operation ALLIED FORCE offers the next datum point in this research effort.

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[282] Andrew F. Krepinevich, "From Calvary to Computer: The Pattern of Military Revolution," *The National Interest*, no. 37 (Autumn 1994): 30.

[283] Lawrence Freedman, *The Revolution in Strategic Affairs.* Adelphi Paper 318 (Oxford: Oxford University Press for the IISS, 1998), 62. Dr. Freedman makes one of the most persuasive arguments for the continued relevance of the vertical command structure.

Information technology will certainly had some influence and that influence may already be evident in the command-and-control of airpower. The following citation is taken from COMAIRSOUTH during Operation ALLIED FORCE, Lieutenant General Michael Short's address to the Air Force Association's Air Warfare 2000 Symposium. It signifies the potential promise and problems of improving information technology in the command-and-control of airpower.

> Real-time targeting. I will share a story. About 45 days into the war, Predator [unmanned aerial vehicle] was providing great coverage for us. About 5 o'clock in the afternoon we had live Predator video of three tanks moving down the road in Serbia and Kosovo. As most of you know, my son is an A-10 pilot or he was at the time. We had a FAC [Forward Air Controller] overhead and General Clark [SACEUR] had the same live Predator video that I had. "Mike, I want you to kill those tanks." We had a Weapons School graduate on the phone talking directly to the FAC on the radio. Two or three minutes went by, and [the FAC] clearly had not found those tanks. The young major's [Weapons School graduate] voice went up a bit and said, "COMAIRSOUTH and SACEUR are real interested in killing those tanks. Have you got them yet?" "Negative." About two more minutes went by and the Weapons School graduate played his last card. "General Short really wants those tanks killed." And a voice came back that I've heard in my house for the better part of 30 years and he said, "God damn it, Dad, I can't see the f---ing tanks!"[284]

[284] Michael C. Short, "Operation ALLIED FORCE," Speech presented at the Air Force Association Air Warfare Symposium 2000, Orlando, Florida, 25 February 2000, n.p. On-line. Internet, 21 April 2000. Available from http://www.aef.org/syposia/short200.html.

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AFHRA	Air Force Historical Research Agency
BACS	Balkans Air Campaign Study
CHECO	Contemporary Historical Examination of Current Operation
GWAPS	Gulf War Airpower Survey
SEA	Southeast Asia

Note: This research paper uses only unclassified information. Extracts from classified sources have been cleared in accordance with AFHRA declassification procedures.

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